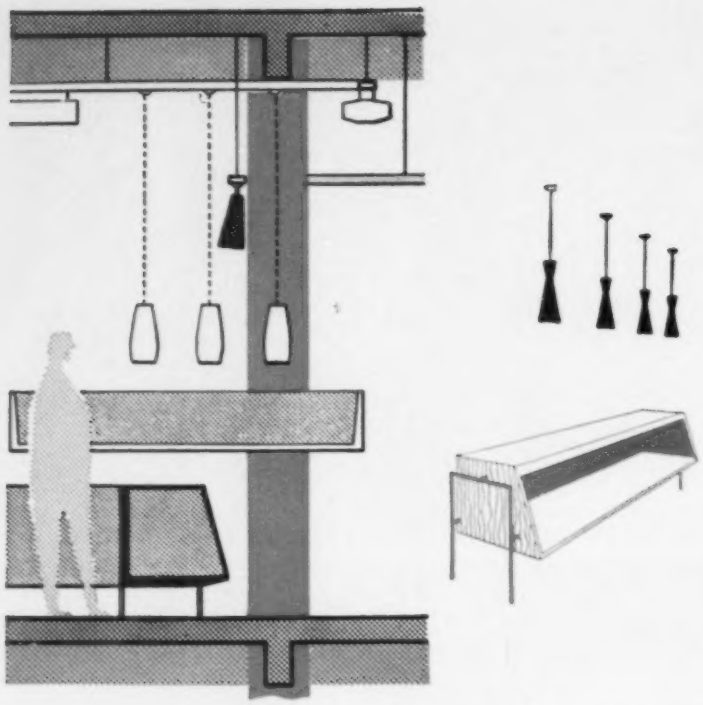
Light and LIGHTING

OCTOBER, 1959 · PRICE 2s. 6d



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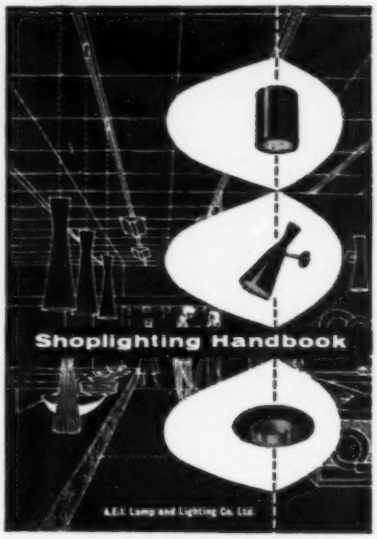

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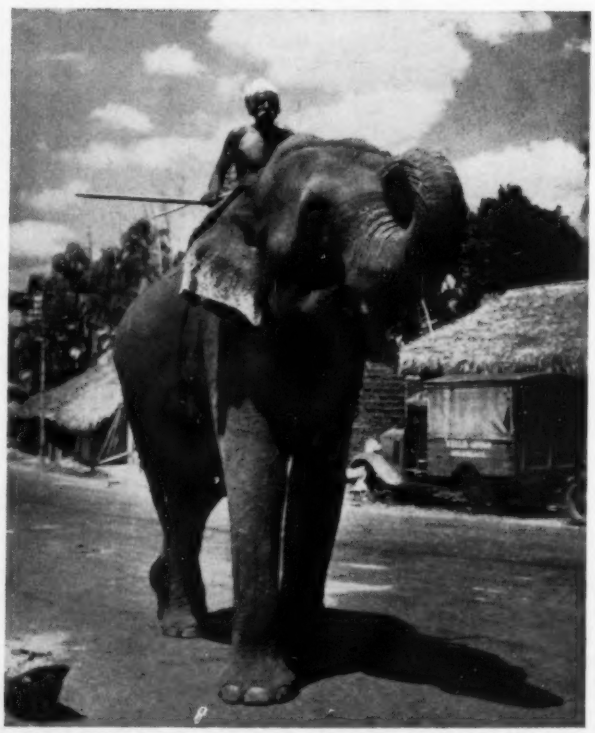
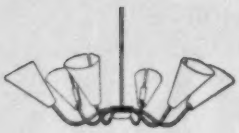
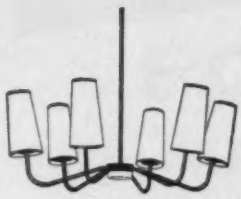
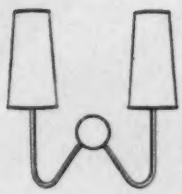


Service by Elephant, Ceylon (Photo J. Allan Cash)







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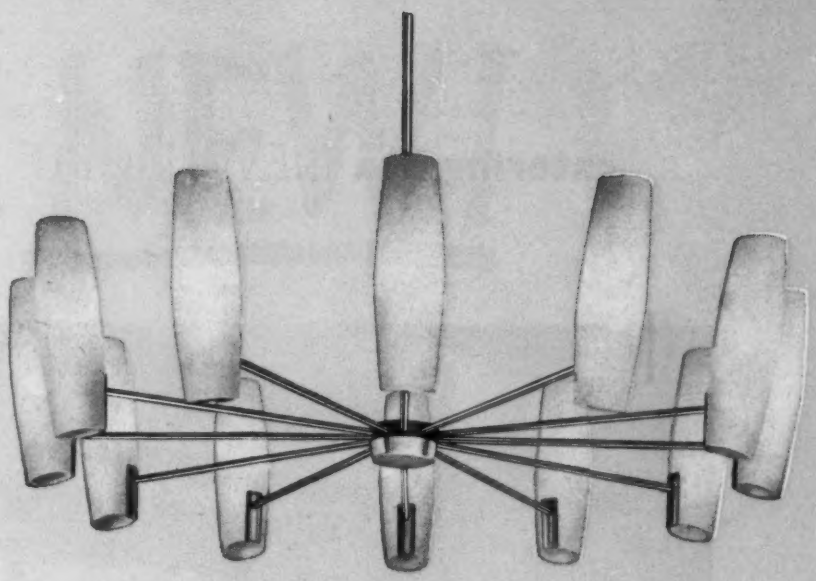

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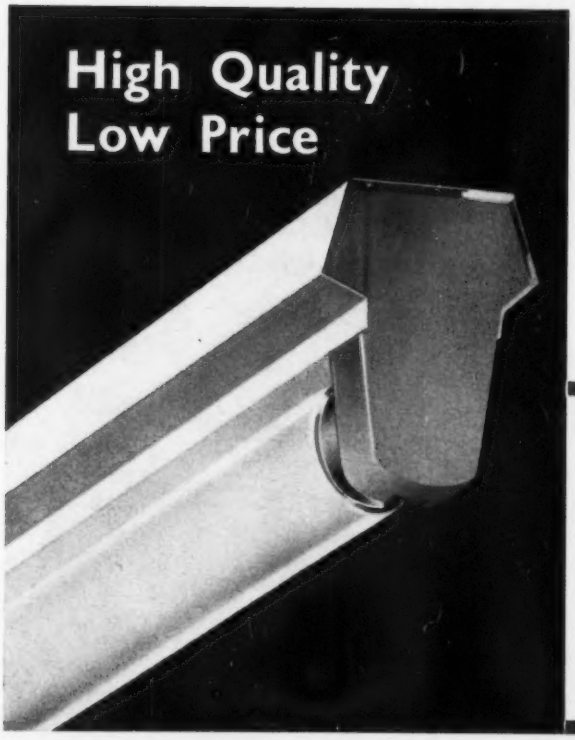

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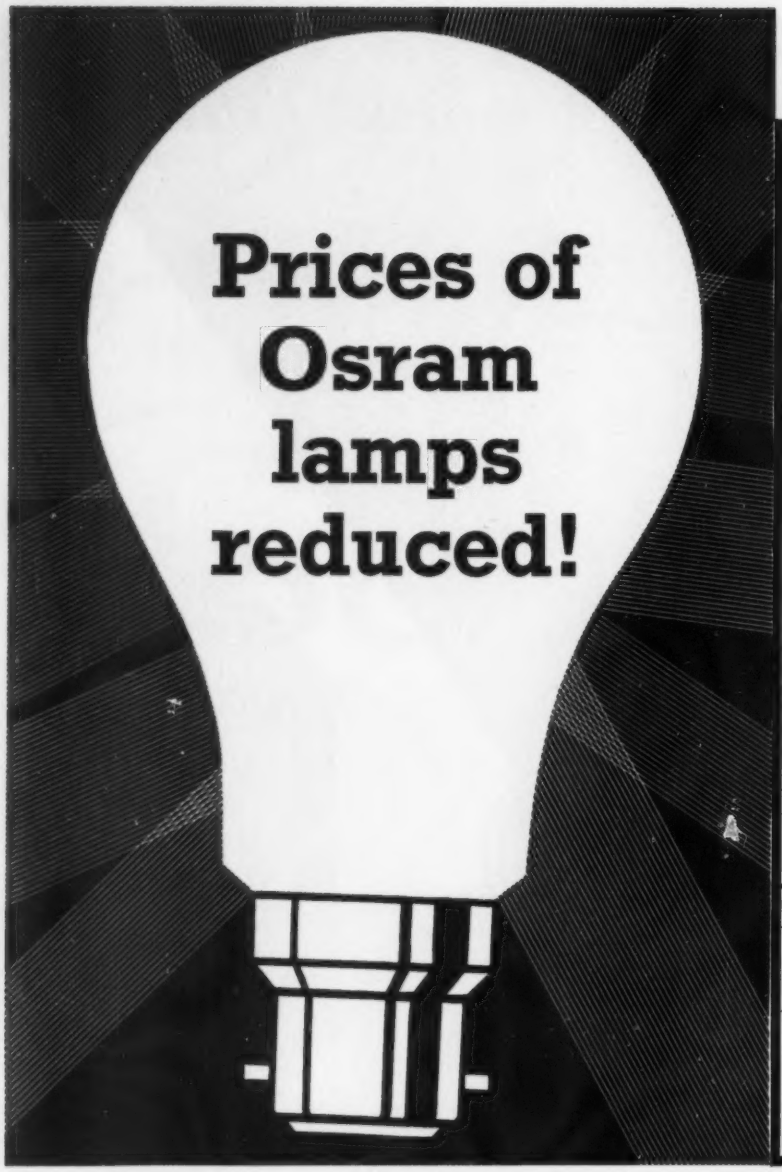

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40	1/4½	1/7½	1/2½	1/5
60	1/4½	1/7½	1/2½	1/5
100	1/10	2/2	1/5	1/8
150	2/7	3/0½	1/11	2/3
200	3/9	4/5	2/11½	3/6
300 NO P.T.	7/6	Clear	6/9	Clear
	8/6	Pearl	7/9	Pearl
500 NO P.T.	10/0	Clear	8/6	Clear
	11/0	Pearl	9/6	Pearl

COILED COIL

WATTS	Old List Price	Total inc. P.T.	New List Price	Total inc. P.T.
40	1/5½	1/8½	1/3½	1/6
60	1/5½	1/8½	1/3½	1/6
100	1/11	2/3	1/6	1/9

SILVERLIGHT 200/250v

WATTS	Old List Price	Total inc. P.T.	New List Price	Total inc. P.T.
40	1/7½	1/11	1/5½	1/8½
60	1/7½	1/11	1/5½	1/8½
100	2/1	2/5½	1/8	1/11½
150	3/1	3/7½	2/5	2/10

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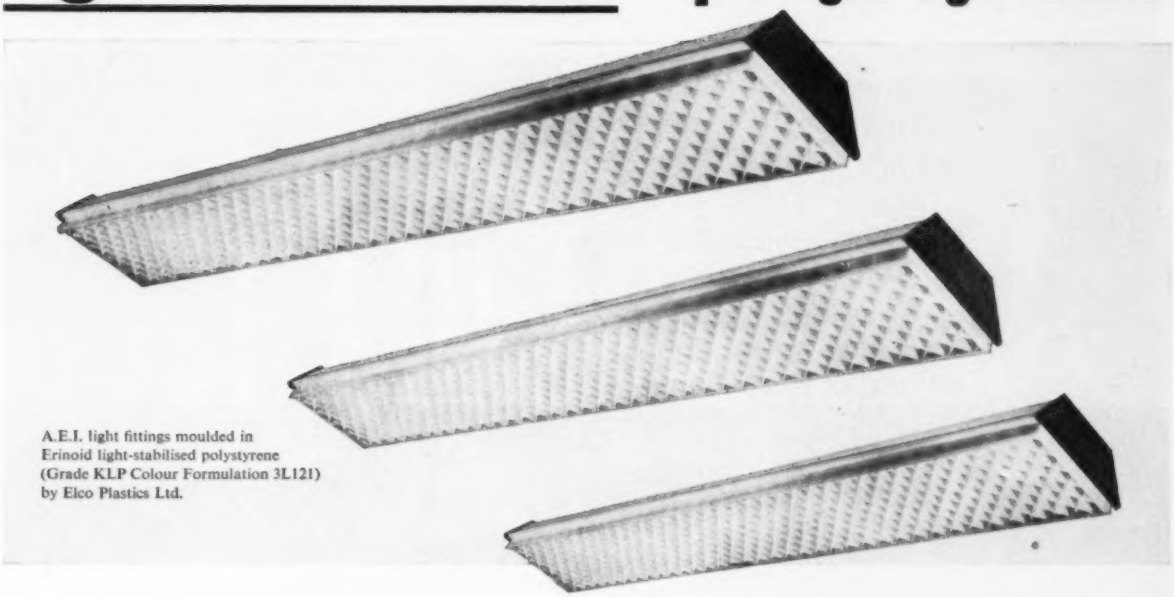

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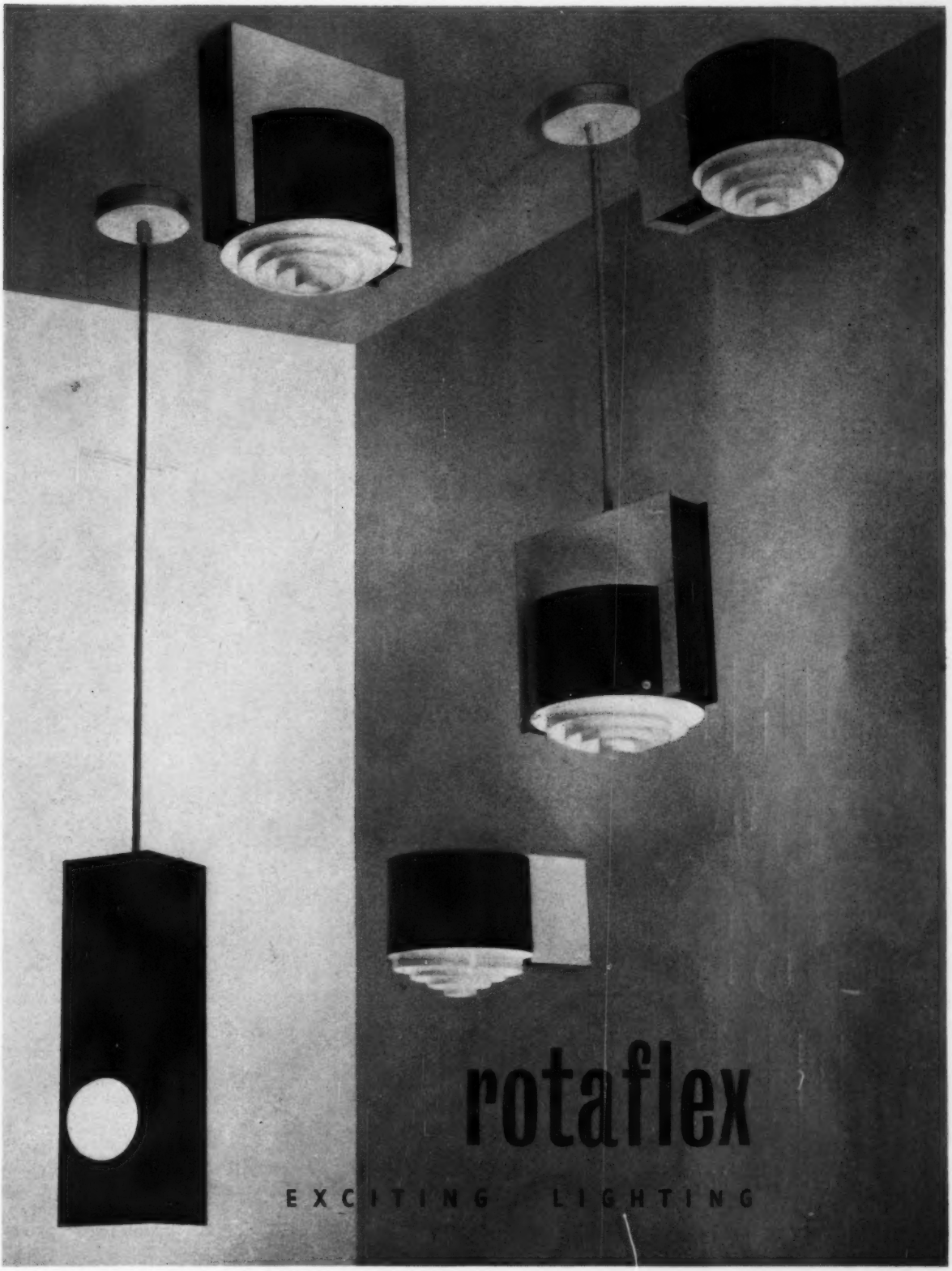

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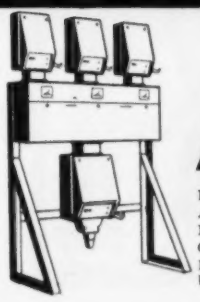

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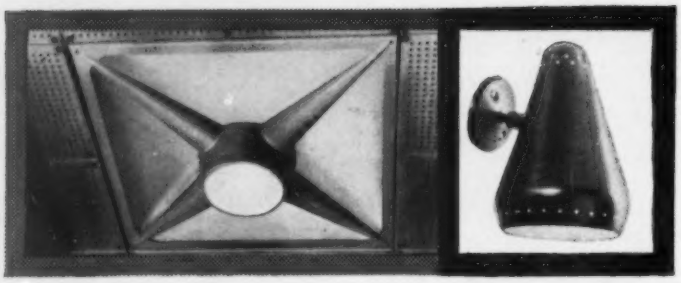
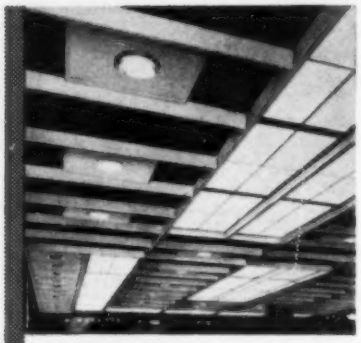
Gold Medallists in Switchgear at the 1958 Brussels Exhibition
Photograph taken for the British Iron & Steel Federation by Adolph Morath

THE CONSETT IRON AND STEEL WORKS *shown above are a leading force in this vital national industry*



Tungsten fittings.



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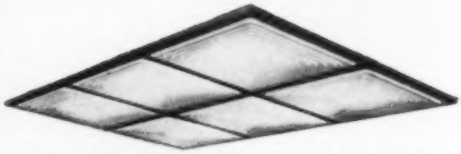

The 'Brite-Glo' 6′ × 4′ packaged ceiling unit also Junior 'Brite-Glo' 6′ × 2′ unit.

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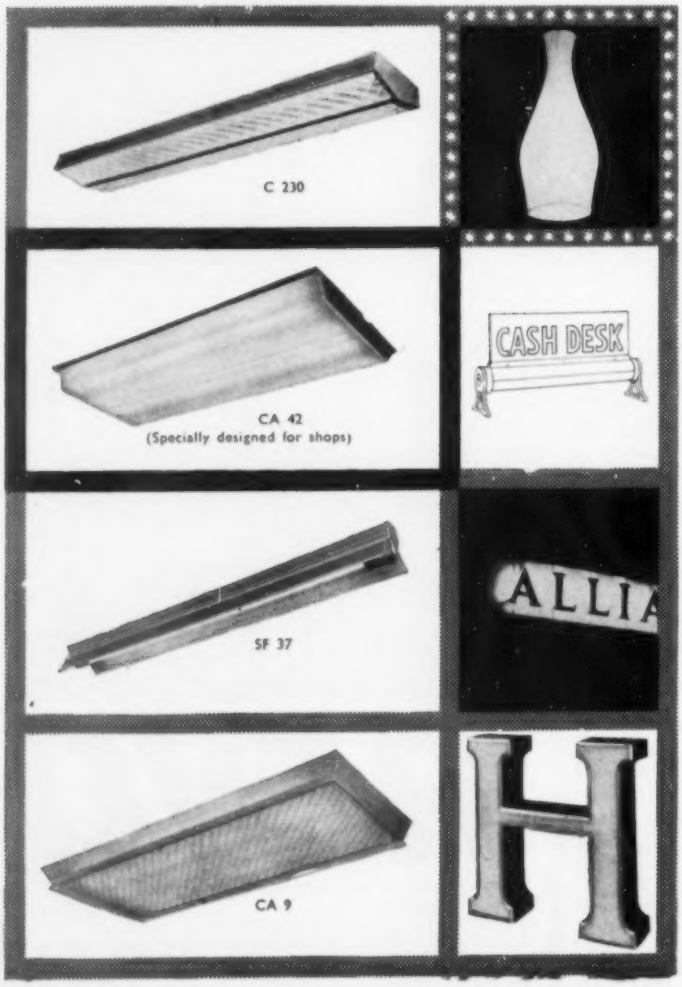

Glassware.

Directional Signs.

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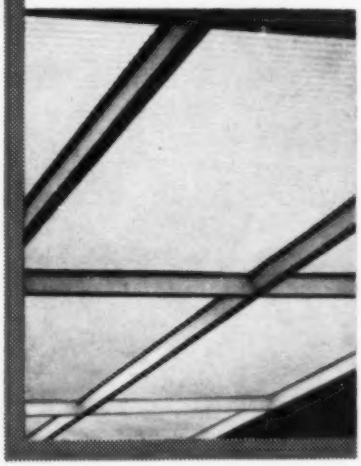
Tungsten fittings.

The 'Glolite 2' luminous ceiling.



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Light and LIGHTING

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contents

The Jubilee Climax

OCTOBER brings the opening of the 51st Session of the British IES and the climax of the Golden Jubilee of the Society. Steady growth in membership and in prestige has come to the Society through the years and neither of these has been undeserved. While it is our hope that growth in membership will continue, the real worth of any technico-scientific society lies not in its numerical strength but in what it does. Even in this, however, what matters most is not the quantity but the quality of its works. The works of the IES are its technical meetings, its publications, its educational and advisory work and its care for the status of its professional members. In all these it has done well and may confidently be expected to continue to do well. It is to its credit that it has done so much at modest cost to its members, for the cost of living has increased as inexorably for societies as for individuals. Much of this credit has been earned for it by the efforts of a minority of members, but this is always—and perhaps necessarily—so and, in wishing the Society continued well-being, we also pay tribute to all those who have done most to make it what it is.

Notes and News

THE name of Guy Campbell is one that has been well known and respected in the lighting industry for the last fifty years and more. The late Guy Campbell was one of those who helped to found The Illuminating Engineering Society in 1909; it is very appropriate that his son should be one of the two presidents to share the distinction of holding office during the Society's Golden Jubilee year.

Mr. H. G. Campbell is well known to lighting people all over the world. He was educated at Oundle and Queens' College, Cambridge, after which he served an apprenticeship with the Benjamin Electric Limited, the company with which his family has always been associated. He joined the Territorial

H. G. Campbell, IES President 1959-60.

Army in 1938 and served with the RAOC and REME throughout the war, reaching the rank of lieutenant-colonel. He rejoined Benjamin after the war as Director of Engineering and is now Managing Director. He is also a director of Holophane Ltd. He is an associate member of both the IEE and the Institution of Mechanical Engineers. (We have a feeling that he is the first mechanical engineer to become president of the IES—though now we have said so no doubt it will be pointed out to us that there have been others.)

Guy Campbell has always been a very active member of the IES; in addition to two periods of office as a member of council and three one-year terms as a vice-president, he has served on numerous committees and was chairman of the committee responsible for the last two summer meetings.

The retiring President, Mr. C. C. Smith, has probably had the busiest term of office of any president of the Society and the Society must be immensely grateful to him for the way in which he has carried out his many duties during this Golden Jubilee year. At the time of writing we have fresh in our minds the address on fifty years progress in lighting he gave at the APLE conference in Aberdeen in which he introduced the broader field of lighting, and the Society, to some thousand public lighting engineers, an address which he had taken considerable pains to prepare and present. During the year he and Mrs. Smith have visited many of the IES Centres and we are sure that the many members who have met him will join with us in hoping that he does not retire too quickly to the " past-presidents' shelf."

Index of Lighting Fittings

One of the features of the British Lighting Council's headquarters at Lancaster Place which is proving extremely useful is a photographic index of the fittings made by the Council's supporting members. It provides a more comprehensive collection of information on lighting fittings than has ever before been available in this country. Each sheet in the index shows a photograph of a fitting with a description, the catalogue number, sizes, colours, finishes and size and type of lamp required. It also gives the price, the name of the design and the manufacturer, and finally draws attention to any particular points of interest. Although this information is obtainable from the catalogues of individual manufacturers, searching them entails sifting much irrelevant material and from this point of view the index can be a valuable time saver. Colour transparencies and a table viewer are also available by the index cabinets so that the type of fitting under consideration can be seen in colour in an actual setting. Similar indices are also available in all regional premises of the Council.

Brussels Exhibition

It would be ungracious, as well as untrue, for us to say that we had forgotten all about the Brussels

Exhibition, but we had thought that so much had been written about it that no more remained to be said. However, we are reminded by the organisers that it has become a tradition to commemorate each exhibition of world status with the issue of a volume giving a retrospective survey of the origin, organisation and course of the event. The book on Brussels 1958 will in fact run to eight volumes each dealing with a particular aspect of the exhibition. This seems a sensible idea as it means that one can get the volume dealing with the matters in which one is particularly interested instead of having to buy, and keep on one's shelves, a large and weighty tome containing much irrelevant material. The section of the Book of the Brussels 1958 World Exhibition which will interest most of our readers is that dealing with Architecture, Gardens and Lighting Effects (128 pages, price 220 Belgian Francs). There is an appendix to this volume which gives 600 plans and 150 plates relating to the general layout and costs another 350 B. Fr. All volumes are available in English, French or Dutch. Orders should be sent to the Commissariat-General of the 1958 Exhibition, Avenue de Meisse, Brussels.

City and Guilds Results

The results of the City and Guilds of London Institute examinations in illuminating engineering held in May were recently announced as follows:—

Intermediate Grade

First Class: R. C. Aldworth, R. E. Allen, C. Cuttle, M. A. Richards, J. Sanderson, C. C. Green.

Second Class: C. H. H. McCullough, P. J. McCulloch, R. Nunn, R. A. Richardson, H. S. Sutton, M. D. I. Welham, H. R. Westmancott, J. S. Hutchison, D. B. Stewart, A. Anderton, Miss D. Godwin, R. A. Hall, W. B. Cooke, S. Cairns.

Final Grade (Papers 1 and 3)

First Class: C. E. Goddard, B. A. Hall, B. Kemp.

Second Class: G. R. Allen, J. C. Budd, D. W. Fleming, R. E. Green, E. J. Mara.

Final Grade (Papers 1 and 2)

First Class: R. L. Gardner.

Second Class: B. Kemp.

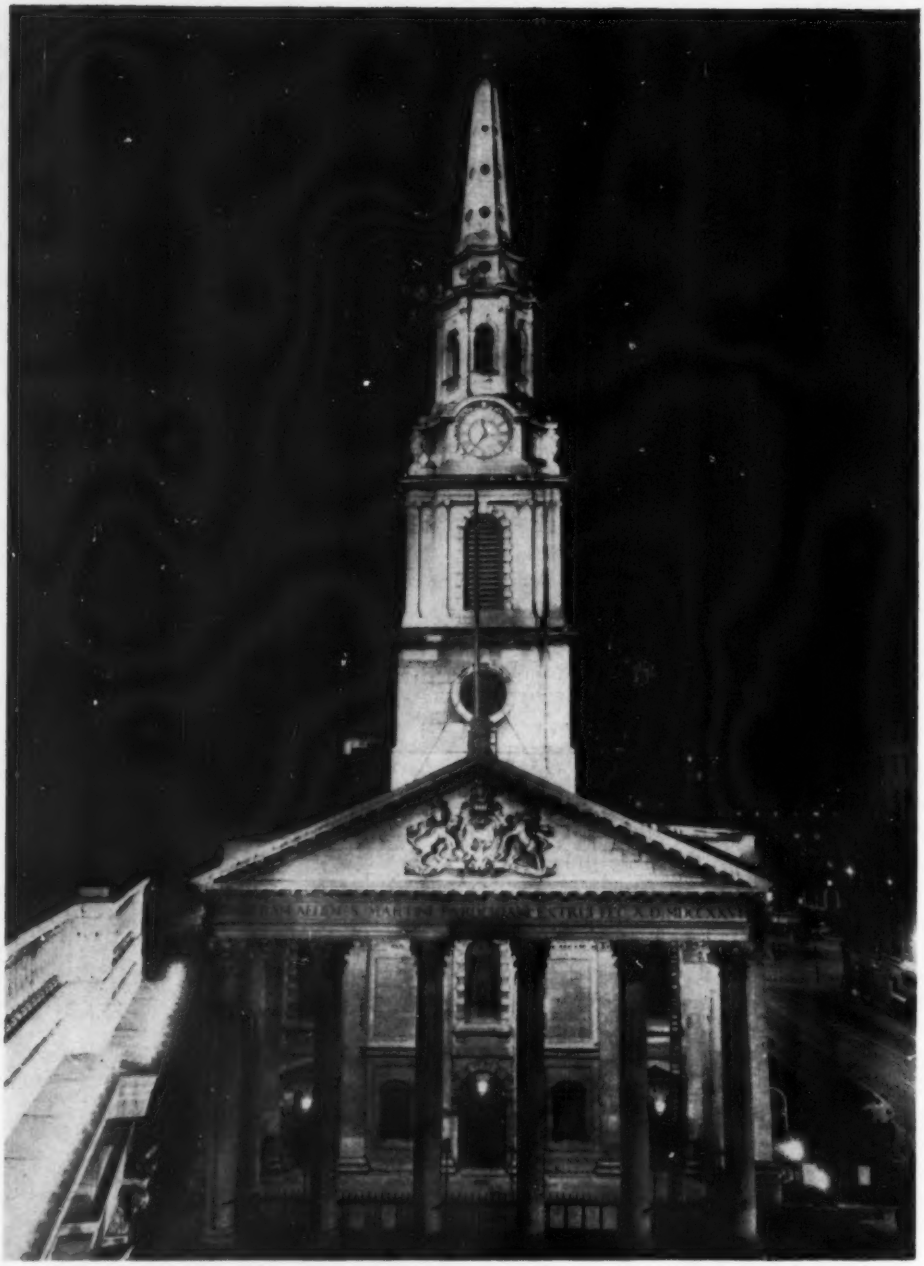
The list of successful candidates this year is very short and should be viewed with some concern by the industry. The shortage of qualified lighting engineers is acute and we would venture the opinion that it will get even more serious in the next few years. What is the lighting industry doing to remedy this state of affairs? On the whole it would seem to be doing very little. Because there is no demand there are still, as far as we know though we should be only too pleased to be corrected, no courses for the City & Guilds examinations other than those at the Borough Polytechnic in London. Would-be students in the provinces have to take a correspondence course which, good as it may be, is not the same as attending a course at a technical college. There never will be a sufficient number of prospective students to make it possible to run courses in all the major cities but one would have thought that there were enough firms in the industry in or around such places as Birmingham, Leeds, Manchester and Glasgow to enable regular courses to be arranged in those cities. We hear quite a lot these days about the training of technologists and there are many exciting (some perhaps sounding more exciting than they really are) branches for young men to follow. Lighting is probably too commonplace to have much appeal for the young man about to embark on his career, but the technology of lighting is advancing at such a rate that if the industry continues to depend for its recruits on those who drift into it by accident then it may find itself very hard up for skilled men.

There are two things which we would suggest the industry might do. Firstly it should demand that all new lighting engineers are holders of the IES Diploma; secondly it should offer salaries and prospects as good as those in other branches of technology. There is nothing new in these suggestions—both have been made before—but they are worth repeating. Salaries are certainly better than they were a few years ago and we have noticed that firms advertising for lighting engineers sometimes ask for the qualification Dip. MIES. (We look forward to seeing the advertisement which says Diploma Members of the IES need only apply.) However, we can hardly assume everything in the garden to be lovely when the number of passes in the C & G examinations falls to its present number.

IES Council

What with the Jubilee, printing troubles and other matters the Secretary of the IES tells us that he has failed to notify members of the Society of the result of the ballot for Council membership which took place in May and has asked if we could spare him a corner to announce the result. As he has had quite a bit on his plate this year and we are inclined to feel even more sorry for him than we do for ourselves we readily agreed.

The result of the ballot was that Mr. Boissevain and Mr. Kemp were not elected, the successful eight being J. G. Christopher, B. M. Cobbe, A. O. Johnson, J. W. Howell, J. S. McCulloch, A. H. Nash, H. R. Ruff and R. L. C. Tate. The result was, of course, announced at the annual general meeting of the Society.



St. Martin-in-the-Fields, the floodlighting of which was arranged by the British Travel and Holidays Association in co-operation with the church council and Atlas Lighting. A combination of low voltage floodlighting and fluorescent tubes is used.

Queen's Building, Exeter University

Architects, William Holford & Partners; electrical consultant, T. Dunwoody, AIEE, FRSA; electrical contractor, Colston Electrical Co. Ltd.; lighting fittings, Troughton & Young Ltd., Falk Stadelmann & Co. Ltd., George Forrest & Son Ltd., Rotaflex (Gt. Britain) Ltd., Atlas Lighting Ltd. (control gear and dimmer circuits), Rowlands Electrical Accessories Ltd., Stewarts & Lloyds Ltd. (outdoor standards), G.E.C. Ltd. (lanterns).

QUEEN'S Building, Exeter University, is a building for the faculty of Arts and Social Studies. It forms part of an extensive development scheme for the university which includes a students' union building, refrectory and administrative block (now under construction); a science building with a nine-storey tower to be topped by a telescope; a hall of residence (to be built in 1961) and a library (planned for 1963).

The new building stands on a magnificent site—wooded and elegantly landscaped—on a high point of the campus, overlooking the City of Exeter and the valley of the River Exe. It comprises four blocks, each of different height, set around a grassed courtyard. The largest (west) block faces the approach road; is four storeys high and houses 80 studies for the teaching staff. Projecting from it is the staff common room with its vast picture window, as seen on page 286.

The north block, which is three storeys high, serves the arts department and comprises 20 lecture rooms, each accommodating between 15 and 50 students. The two-storey east block houses lecture rooms and laboratories for the departments of geography and geology, while the south block consists solely of the junior (students') common room, with its double pitched roof and with large dormer windows above the fanlights of the French windows leading to the courtyard.

The building has a frame of reinforced concrete, faced mainly with hand-made Sussex bricks, except for the projecting staff common room, where Portland stone has been used. Windows throughout are aluminium-framed double-hung sashes (some with fanlights over), arranged to give a classical quality to the façades of this otherwise modern building. On south and west elevations the windows are fitted with venetian blinds; some are fitted also with black-out blinds.

Inside the building, one notices the high standard of the interior finishes, the furniture and the lighting fittings, although it is understood that the total cost, including furnishings, was not above the average figure per foot cube for this type of building. Wall finishes include a proprietary plaster with a permanent glazed finish; hardwood boarding in the staircase hall and the junior common room; fair-faced brickwork in the entrance hall and boldly patterned wallpapers in the common rooms. Floors are mostly of pvc tiles, with Wilton carpet in the senior common room, terrazzo for the stairs, and stone paving for the entrance hall with its atmosphere of a cloister.

In conjunction with the ceiling heating installation, most ceilings are of perforated metal trays. In circulation areas where excessive noise might occur there are areas of coarse-textured acoustic plaster, painted an attractive dark grey-blue; while in the junior common room the sloping areas of ceiling are lined with grooved fibreboard.

Colour schemes are, in accordance with current fashion, basically grey and white, with areas of natural hardwood and other, small, areas of stronger colour—e.g., for some doors and for the upholstery fabrics in the common rooms. In the smaller lecture rooms areas of wall below the windows are strongly coloured, and the wall above and below the blackboard is coloured to prevent excessive contrast.

Cloister-like entrance hall, with general lighting from grey metal framed surface-mounted downlights with glass covers. Notice boards on the wall facing the entrance doors are lit by clerestory lighting from miniature "north lights" set in the flat roof. At night the notice boards are lit from the same direction by concealed fluorescent lamps.

Lighting

Two types of installation are used in the teaching rooms: In geography rooms, where maps and charts—some old and indistinct—must be read, a relatively high degree of illumination (about 201m/ft²) is required. A special fluorescent fitting, which has been used also in laboratories and departmental libraries, was developed in collaboration with the makers, Troughton and Young Ltd. Simply constructed, for economy, it comprises a sheet-metal reflector, diabolo-shaped in section to give both upward and downward light, the latter being the larger component. Housing a single 5-ft. lamp, it is suspended from the ceiling and, to ensure a low surface brightness (ceilings are comparatively low), it is fitted with a reeded glass cover, this material being chosen for easy cleaning. Geography rooms include, incidentally, special tracing tables with built-in lighting from 2-ft. fluorescent lamps.

The geography department includes one large lecture room, equipped with a slide projector. Lecturers often speak from the projector, *via* an amplification system, with a loudspeaker on the rostrum. Fluorescent lighting in this room is on a dimmer circuit operated from the projector so that, to assist students in writing their notes, the lighting can be raised to the highest level compatible with satisfactory vision of the slide being projected.

In ordinary teaching rooms, which may be used for teaching a variety of subjects, an inexpensive tungsten fitting was chosen (a "Rotaflex" fitting marketed specially for classroom use), four fittings adequately lighting a typical small classroom. Before the final choice was made, experiments with various fittings were carried out in lecture rooms of other buildings of the university. Blackboards are lit by fluorescent lamps in simple sheet-metal reflector units.

The staff and junior common rooms are lit by fittings of a more domestic appearance: chandeliers and wall brackets with inverted "brandy bowl" shades of opal glass in the former and with diabolo-shaped shades in the latter. In the staff common room there is additional light from small glass-covered downlights which, in the evening, illuminate the floor-to-ceiling curtains and, on the opposite side of the room, the sideboard and the pigeon holes for staff mail. In the junior common room there is also a row of (larger) downlights, recessed into the hardwood soffit of a low-ceilinged area.

The large lecture theatre has no windows, being lit during the day from a large laylight covering almost the entire ceiling area. Egg-crate louvres of sheet steel reduce surface brightness (ceiling height at the rear is only 7 ft. 6 in.) and also serve to diffuse artificial light from rows of fluorescent lamps. These lamps are arranged under the glazing bars to minimise obstruction of the daylight

Above, staff study (typical of the eighty rooms of this type in the four-storey west block), with fluorescent lighting fitting as used in the geography lecture rooms, supplemented by "Anglepoise" table lamp. Below, junior common room, with double pitched roof and large dormer windows above the fanlights of the French windows; downlights in the low ceilinged area; eight-light chandeliers; and matching wall lights.

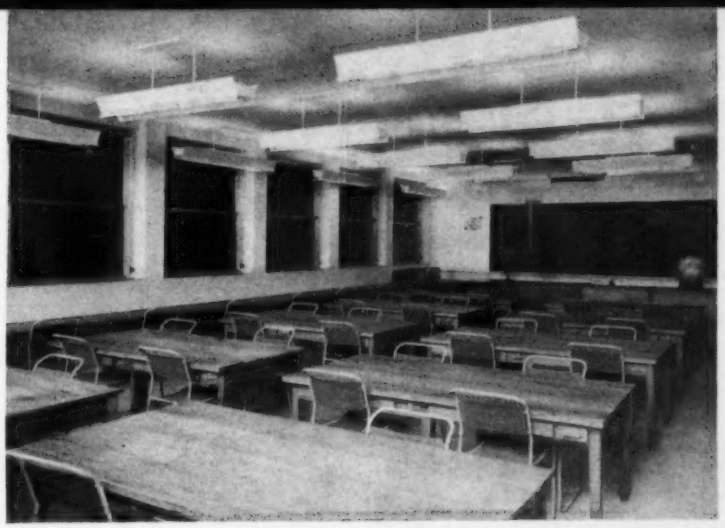
and are on a dimmer circuit push-button controlled from the rostrum. An electrically operated horizontal blind provides " black-out " when films or slides are projected. Peripheral lighting, separately switched (again by push-button) is by recessed downlights.

Corridors are mostly lit by downlights recessed into the heated ceilings. In the wider corridors, to reduce noise, a central strip of the ceiling is finished with acoustic plaster instead of the perforated metal trays used elsewhere, and it is into this strip that the downlights are recessed. As with downlights throughout the building, glass covers are smaller in diameter than the frame of the fitting to assist in providing ventilation for the lamp.

The corridor in the geography department (on the first floor of the two-storey wing) is lit to a higher intensity, necessitated by the fact that maps and charts are mounted on the corridor walls. Between a series of rooflights of square glass lenses are mounted directly to the ceiling a row of fluorescent fittings with " Perspex " covers. Staff rooms are each lit by one fluorescent fitting (as used in geography rooms), plus an " Anglepoise " table lamp on the desk.

Outdoor lighting along the approach road and in the courtyard is provided by lighting standards and post-top lanterns of attractive and appropriate design. Much attention was paid to the siting of these standards in relation to the landscaping, the existing trees and the roadways.

Top, vast picture window of staff common room giving magnificent view across the valley of the River Exe. Above, another view of same common room, showing general lighting from eight-light chandeliers and matching wall lights, with recessed downlights along window wall and above pigeon holes for staff mail on opposite wall. Table lamps have ceramic bases decorated with classical motifs.



Top, lecture room in geography room department lit by specially designed fluorescent fittings, diabolo-shape in section, with reeded glass cover and substantial upward component of light. Centre, typical small lecture room in arts department lit by four " Rotaflex " classroom fittings, supplemented by fluorescent blackboard unit. Bottom, lecture theatre with daylighting solely from large laylight covered by egg-crate louvres of stove-enamelled sheet steel. " Blackout " by electrically operated horizontal blind; artificial lighting (from fluorescent lamps concealed by the louvres) on dimmer circuit, push-button controlled.

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TGA 123/2

Heating and Lighting

By W. ROBINSON,
B.Sc., A.M.I.E.E., F.I.E.S.

In this article the author discusses the possibility of making use of the heat given out by lighting equipment and mentions two installations where this is already being done.

THE heat given off by electric lighting is mostly a nuisance and is almost always wasted. For this reason lighting, even by the most efficient light sources, is wasteful of energy. The conception of cold light is one which arises out of the frustration engendered by lamp heat; it is rather like the philosopher's stone, or the elixir of life—a pleasant but unrewarding study.

A more practical exercise is to consider what are the chances of using the heat given out by a lighting installation. These are good under certain conditions but are best discussed by considering what happens to lamp heat in most lighting installations. Heat from a tungsten filament installation will be radiated very much as the light is radiated and will give immediate heat of an intensity roughly proprotional to the illumination at any point. Areas or persons thus heated will increase in temperature and re-radiation will occur, combined with air convection. Thus local air temperatures will rise. The process is complex but the net result is simple—the entire wattage absorbed by the lamps and control equipment inside the room will be converted to heat. It would seem, therefore, that if the lighting wattage should equal the heating wattage requirement of the room there should be no further heating required. There are, however, several difficulties about this, *viz.*—

(*a*) Tungsten filament lighting corresponds to very high temperature radiant heating in an unacceptable form, with a high temperature gradient, high head temperature and low feet temperature.

(*b*) The wattage and the distribution of radiation required would introduce an intolerable degree of glare.

(*c*) Fluorescent lighting would mitigate both (*a*) and (*b*) but the wattage required remains the same and corresponds to even higher illumination values. Furthermore the convected heat from the fittings builds up above them and heats the ceiling rather than the floor.

In practice our habit of ventilating interiors by the simple expedient of opening and closing windows according to individual whims and by chimney flues, draughts, etc., is very successful in removing the convection component of lamp heat whilst the normal general lighting intensity is insufficient to produce a significant amount of radiant heat. In fact this seems to be where we came in!

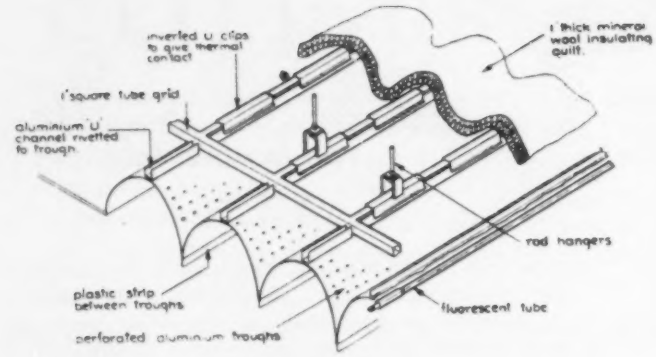
A New Approach

Some recent buildings and lighting installations, however, have opened up a new approach to this problem. One of these is a development and research building in the North East of England, which is thermally insulated, has a controlled system of ventilation and about 80 lm/ft² of fluorescent lighting. The heating system is ingenious, consisting of hot water pipes in grids sandwiched between thermal insulation above and a coved aluminium ceiling below to which the heating pipes are mechanically bonded. This ceiling is also designed to serve as the lighting reflector. Heat is conducted from the pipes to the aluminium ceiling which becomes an overall low temperature radiator. The interesting point is that it does not affect its function whether it be heated by the hot pipes or by the fluorescent lamps. In practice the lamps heat up the ceiling to the point where thermostats cut out the hot water system and the lighting installation becomes the heating installation.

The calculated heat requirement of this building (30° F external to 65° F internal) is 19.5 B.Th.U. per hour per sq. ft. of heated ceiling area. The heating equivalent of the lighting (4½ watts per square foot) is 20.4 B.Th.U. per hour per sq. ft. of heated ceiling area.

A new electric relay production plant in the same part of the world has provided additional data on this subject. The calculated heat loss of the assembly shop in this plant (38,400 square feet, 14 ft. high) is as follows:—

	B.Th.U./hr.
Floor	40,700
Walls and windows	100,000
Ceiling	192,000
Assumed air change, ½ per hour	215,500
	548,200



Arrangement of one type of ceiling described in this article with a view of a large drawing office in which such a lighting and heating system is installed.

The heating wattage required (28°F external to 68°F internal)

$$= \frac{548{,}200}{3{,}410} = 160\text{kW (approx.)}$$

Lighting is by 2,404—9ft. cold cathode tubes giving 80 foot-candles in service.

Lamp wattage, at 8 watts per foot run,

$$= 2{,}404 \times 9 \times 8 \text{ watts} = 174 \text{ kW}.$$

This shop is virtually windowless, with good thermal insulation, and has a comprehensive combined heating and cooling plant and, of course, controlled ventilation.

Cooling and Ventilation

An examination of the heat loss data of the above installation immediately shows the significance of ventilation. If the air were changed once per hour, instead of once per two hours, heating requirements would jump 40 per cent, and if the ventilation were hit and miss the heat contribution of the lighting could well fade into insignificance. (And, incidentally, when 174kW becomes insignificant it is high time to examine the economics of openable windows.)

The other aspect which requires further study is the dissipation of excess heat in summer. This is more complex since the heat produced inside an insulated building tends to stay there whatever the season. Lighting must be provided, however, whether it is through glass or via electricity, so the problem is not peculiar to a windowless factory; it is a problem inherent in the thermal insulation of buildings. We cannot say with certainty whether the cooling problem is greater with all-electric lighting than with natural lighting but we must accept the proposition that a high degree of thermal insulation does not normally go with extensive roof glazing. In other words, factory thermal insulation is likely to involve special steps to remove unwanted heat in summer, and particularly the heat supplied by the lighting. The wholesale opening of windows may, of course, be encouraged but this becomes less and less helpful as the outside temperature rises. Similarly the ventilation system can boost the air change rate,

within the same limitations. The only fully satisfactory answer is artificial cooling.

Profit and Loss from Thermal Insulation

The economics of thermal insulation are obviously less simple than may appear at first sight, for the cost of heat dissipation in hot weather may have to be set against the saving in winter heating cost. Also to be considered are the pros and cons of full-time electric lighting which permits the use of maximum thermal insulation, or of part-time daylighting which permits a lower standard of thermal insulation. Furthermore allowance must be made for the fact that the combination of thermal insulation with summer cooling and ventilation is capable of producing uniformly acceptable working conditions throughout the year, a feature hitherto unheard of in most British interiors of any kind. Who can say how much extra this is worth?

Light-Heat Integration

The most practical way of making use of lamp heat is to co-ordinate heating and lighting installations, particularly in those interiors where it is not practicable to put the entire burden on the lighting. The latter situation may arise because the lighting is not in operation 100 per cent of the time or because insulation and ventilation control are not adequate for the purpose. For such integration to be effective the heating installations must have a quick response and be under thermostatic control. This suggests on-peak electric supplementary heating with the useful feature that, since most of it will normally be used only when the lighting is off, it incurs no additional maximum demand charge and is paid for at the low follow-up unit rate.

It would seem, therefore, that when an insulated and air conditioned or force ventilated building is contemplated the builders would do well to investigate the economics of installing lighting of sufficient wattage to supply adequate heating for an outside temperature of about 30° with supplementary electric heating as necessary under full thermostatic control, subdivided so that only that part required to provide a heating boost during extra cold weather would incur extra load charge.

Summary and Conclusion

To summarise the situation it appears that the following conditions will need to be satisfied for the effective and economic use of lighting for heating:—

(1) The building, and particularly the ceiling, must have good thermal insulation.

(2) The ceiling must receive most of the upward radiation and convection from the lighting installation, i.e., the lighting must be on or near the ceiling.

(3) The ceiling material must have a high radiant emissivity (as is the case with aluminium).

(4) The rate of air change must be strictly controlled.

(5) The electric lighting must be in regular use during the production period.

Given the above conditions any fluorescent lighting installation giving over 50 lm/sq. ft. can help to pay its way by reducing heating costs. With 100 lm/sq. ft. it can virtually take over the heating. At substantially higher levels some cooling arrangement is going to be needed and the thermal insulation can be of a lower standard without ill effect in winter.

There is nothing really fanciful about this. For some time now it has been apparent that the provision of day-lighting as a means of reducing the use period of electric lighting is economic folly. It is not folly to desire natural lighting and to be prepared to pay the extra heating and fabric costs, but in a competitive world can industry as a whole afford the luxury of greenhouse factories? How long will management tolerate ever increasing heating and fabric costs in order to avoid the use of electric lighting the cost of which is going down, instead of up? The two plants instanced in this article are much more likely to set the pattern of future industrial building than are most of the factory buildings now being erected.

Potential Application of the Linear Sodium Lamp to Street Lighting

By G. K. LAMBERT* B.Sc. (Eng.), A.C.G.I., D.I.C., A.M.I.Mech.E., A.M.I.E.E.

The new 200-watt sodium lamp with its higher efficiency is now being carefully studied by street lighting engineers to ascertain how it can best be used to improve safety on the roads. The following article discusses the properties of the lamp and how they may be applied.

(1) Introduction

There is currently great interest in higher powered sodium lamps. Some lighting authorities need to provide higher levels of illumination for routes carrying dense traffic. Others wish to obtain lighting of Code quality more economically by using higher powered lamps at higher mounting heights and wider spacing. With the latter may be included those needing to improve pre-Code of Practice installations where it is cheaper to increase the height of the lanterns instead of putting in more columns.

The new linear sodium lamp[1] invented and developed by the A.E.I. lamp and Lighting Co. Ltd. can help in either case and offers the following advantages:—

(1) Due to its higher efficiency it produces 25 per cent more light for the same power consumption.

(2) The lamp can be made in higher wattages without loss of efficiency and road illumination can be increased considerably with relatively small increase in cost.

(3) The effective light source is a single bar and better light control is possible than from the two limbs of the conventional type of sodium lamp.

(4) By virtue of the lamp construction the source is located accurately and the designed light distribution can be achieved and maintained in practice.

(5) Its greater length and increased brightness combine to permit provision of a given beam intensity from a shallower lantern than was needed previously so that better looking lanterns are possible.

(6) The lamp can be tilted (a) to obtain the maximum illumination on wide roads and dual carriageways and (b) for aesthetic reasons.

(7) The slight fall in efficiency as the lamps age is offset by a slight rise in power consumption so that there is no great fall in light output. This makes the lamp particularly suitable when a maintenance contract is based on Section 3, para. 302 of the Code of Practice on Street Lighting.

* Application Development Department, A.E.I. Lamp and Lighting Co., Ltd.

(2) Lamp Characteristics

Fig. 1 compares the cross section of the new light source with that of the 140-watt lamp. Table 1 shows how its intrinsic brightness compares with that of other lamps used in street lighting.

The 20,000 lumen lamp is 3 ft. long with an arc tube diameter of about 1 inch. Fig. 2 shows the polar curve of light distribution from the lamp in the plane normal to the lamp axis. The lamp is mounted with the crescent grooves at the sides and it will be seen that there is one third greater intensity sideways than downward.

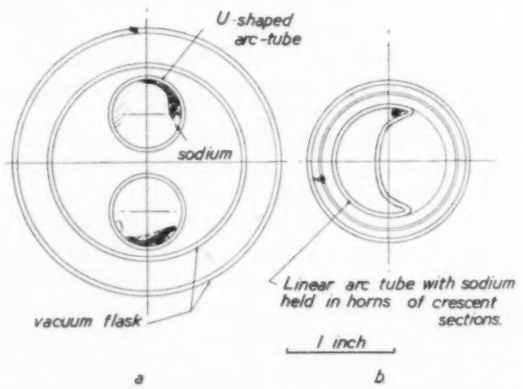


Fig. 1. Comparison of cross sections of (a) conventional 140-watt sodium lamp and (b) the new linear sodium lamp.

Table 1

Brightness (Luminance) of Lamps Commonly Used in Street Lighting

Fluorescent	0.8	cd/sq. cm
140-watt SO/H (Dewar type) ...	7	,,
New Linear Sodium	13	,,
Mercury 400-watt MBF/U	16	,,
Mercury 400-watt MA	150	,,
Tungsten Filament	1,000	,,

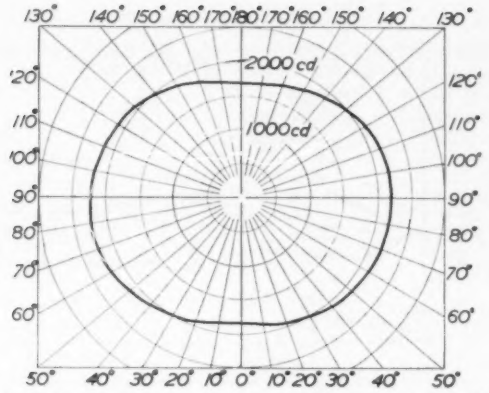


Fig. 2. Polar curve of candle power distribution from a 20,000 lumen linear sodium lamp in the vertical plane normal to the lamp axis. This curve is as measured from one lamp and shows the close symmetry resulting from the balanced distribution of sodium in the new lamp.

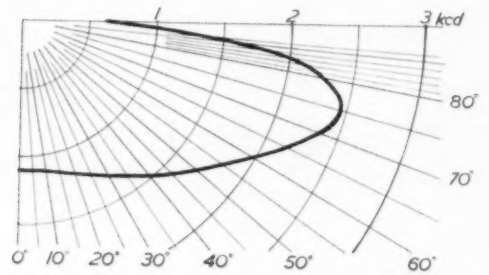


Fig. 3. Polar curve of light distribution in a vertical plane normal to the lamp axis for a conventional 140-watt sodium lantern.

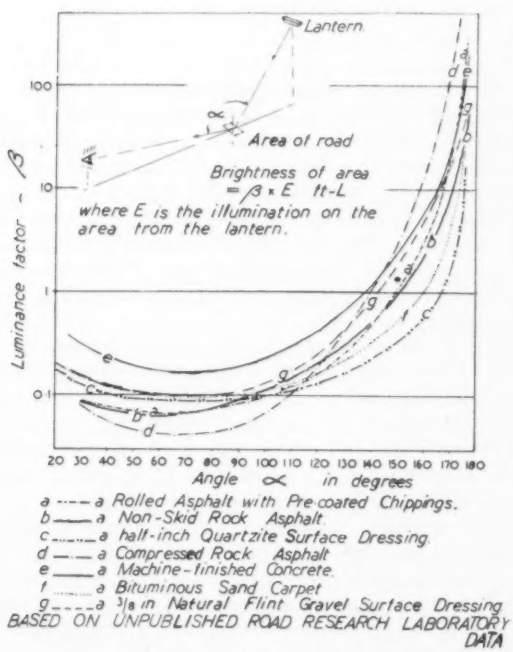


Fig. 4. Reflection characteristics of some modern road surfaces in dry condition, as determined by the Road Research Laboratory.

† Unpublished data.

(3) Choice of Lantern Light Distribution

The plan light distribution, in common with that of other horizontal linear light sources, is not amenable to control but fortunately is well suited to street lighting.[2]

A vertical plane light distribution commonly used in British lanterns housing one 140-watt sodium lamp is shown in Fig. 3. Reference to the BS Code of Practice shows that it complies with the definition of the non cut-off medium angle beam distribution but that the intensities emitted above the beam are about as high as is accepted.

Appraisals of existing installations suggest that where the road surface is responsive to light at high angles the road appears bright enough to offset the extra glare from the lanterns. Where the road surface does not respond so well, light at these high angles is detrimental to visibility and comfort. This distribution is possibly not the best compromise for modern road surfaces.

Fig. 4 shows the reflection characteristics of a number of surfaces measured by the Road Research Laboratory.† (For simplicity data is given only for the points on a line through the plan positions of the observer and the lantern.) Of these surfaces the most commonly used in towns are:

Rolled asphalt with precoated chippings,
Non-skid asphalt,
Granite chip surface dressing.

The first of these after a fair amount of wear responds quite well to high angle light and the light distribution shown in Fig. 3 is not excessively glaring. With the other surfaces a sharper cut-off, with half peak intensity at between 81 and 83 degrees provides a better compromise.

Comparing a new type lamp of say 20,000 lm with the old type with 10,000 lm output, road illumination and brightness values will be doubled if the same light distribution is employed at the same mounting height and spacing. Recent work[3] suggests that a greater road brightness diversity is acceptable at these higher average road brightnesses permitting a reduction of glare intensities.

Hopkinson's formula for discomfort glare indicates that discomfort will increase only by about 1/10th of the step between his widely spaced criteria when the light source brightness is increased from 7 to 13 cd/sq. in., the change in light output not affecting discomfort glare provided light distribution, etc., are not changed. When a given level of lighting is provided by more powerful lanterns at increased spacing there will be a greater fluctuation of discomfort glare as the driver goes along the installation although the average is unaltered. The increase in peak glare amounts to half of the step between two criteria, e.g., the step from "Just uncomfortable" to "Just tolerable". These considerations all support a change of light distribution towards those represented by the polar curves of Fig. 5.

(4) Spacing and Mounting Height

The choice of spacing and mounting height depend on the level of illumination required. As a guide to possible levels it is interesting to note that certain streets in the centre of Birmingham are lit by metal filament lamps

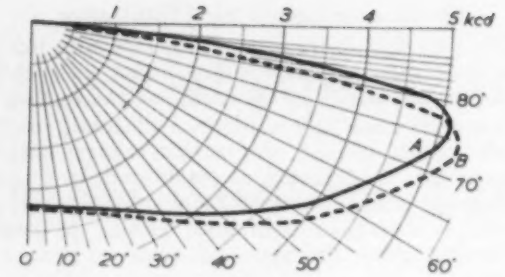
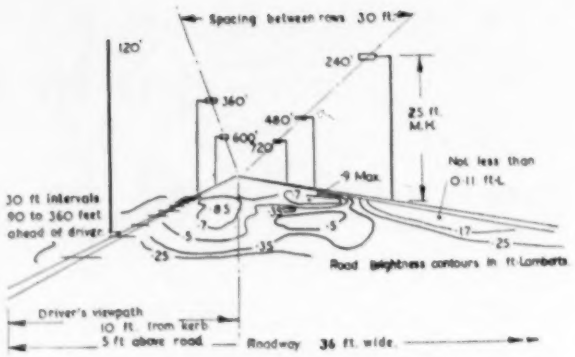
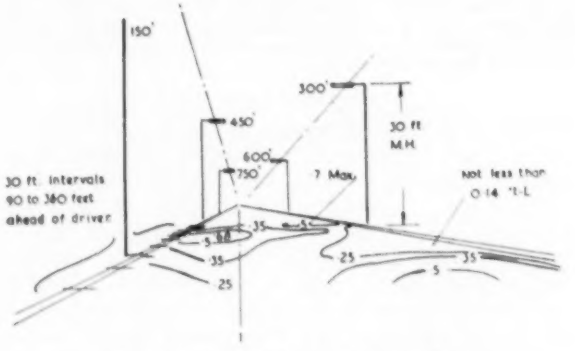


Fig. 5. Suitable light distributions for a lantern using a 20,000 lumen lamp for use with modern road surfaces.



(a) Code of Practice installation.



(b) Modernised 150-ft. spacing installation.

Fig. 7. Road brightness pattern for a 140-watt sodium Code of Practice installation, with below the pattern when a 20,000 lm sodium lamp is used to modernise a pre-code installation.

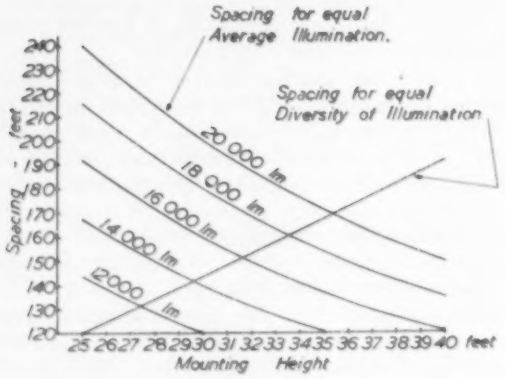


Fig. 6. Curves showing spacings at which higher powered lamps can be used while maintaining equal average illumination or equal diversity of illumination for different mounting heights.

at some 35,000 lm/100ft compared with the Code of Practice recommendation of up to 7,000 lm/100ft. Some London thoroughfares are provided with 17,000 lm/100ft by fluorescent lamps.

Certain through roads in large towns and cities carry heavy mixed traffic and sodium lamps provide the most economical lighting for these. Sodium lighting is popular with motorists and its colour can mark a through route where shopping and civic centres are lit by light of a better colour. The higher illumination levels which it permits encourages driving with greater confidence and relaxation due to the greater speed of vision at high brightnesses[1] and the enhanced direct vision of nearby objects in dense, fast, traffic.

A sub-committee set up by the Association of Metropolitan Borough Engineers and Surveyors has recently been considering the lighting of main through routes, and recommends up to 10,000 lm/100ft [3].

Installations of 140-watt SO/H lamps at Code recommended spacings provide around 6,000 lm/100ft. The new type of lamp of 20,000 lm output will under the same conditions provide 12,000 lm/100 ft. At the 90 ft. spacing suggested by the sub-committee the rating of the installation would be around 16,000 lm/100 ft.

Where it is desired to use the new type of lamp to help meet the requirements of the Code as economically as possible, the mounting height and spacing can be increased. Equal diversity of illumination as well as equal average illumination is, however, required. Fig. 6 enables the most economic arrangement to be picked out for lamps of the various lumen output figures indicated. It will be seen that, using a lamp of 20,000 lm output, the most economic straight road installation, indicated by the intersection of the equal average illumination and equal diversity curves, is at 170 ft. spacing with 36 ft. mounting height.

Due to the slight change of geometry because the driver's view-point remains at the same height while the other dimensions have increased, and to the fact that extra light flux is provided and where there are backgrounds this will not be wasted, it should be possible to use a spacing of 180 ft. with 35 ft. mounting height and get Code quality street lighting. (Trials are being made to determine whether it will be possible, using a carefully chosen light distribution, to extend the spacing to as much as 200 ft.) However, 35 ft. is above the reach of many existing tower wagons though most of them enable work to be done at 30 ft. With such a mounting height the greatest economy is probably obtained by using a 14,000 lm lamp at 144 ft. spacing to get the same road brightness, or by using a higher powered lamp at 150 ft. spacing and accepting a greater diversity because of

Table 2

Comparison Between a Code of Practice Installation and the Proposed Modernisation Installation

	Code of Practice Installation	Modernisation Installation
Lamp	140W SO/H	20,000 lm
Light Distribution		
Beam Angle	75°	75°
Angle of cut-off to half peak intensity	83.5°	81°
Mounting Height (ft) ...	25	30
Spacing (ft)		
along road	120	150
across road	30	30
Illumination (fc)		
maximum	1.82	1.35
minimum	0.26	0.30
average	0.70	0.80
diversity	7.05	4.45
Road Brightness*		
maximum	0.90	0.71
minimum	0.11	0.14
average	0.42	0.35
diversity	6.6 : 1	5 : 1
Discomfort Glare		
Hopkinson's constant ...	2.6	1.7
rating†	Distracting but not uncomfortable	Distracting but not uncomfortable

* rolled asphalt with precoated chippings.
† see reference (6).

the higher average brightness. This provides an answer for those needing to modernise 150 ft. spacing installations without the cost of new columns and services.

The electronic computer has been used to predict installation performance[6] in terms of road brightness, discomfort glare rating, veiling glare and revealing power (or preferably intrinsic contrast) as modified by glare, using Road Research Laboratory data on road surface reflectivity. Fig. 7 shows the road surface brightness patterns determined in this way for a Code installation using lanterns with a polar curve as shown in Fig. 3 and for a more economical installation using lanterns having polar curves as shown in Fig. 5b at 30 ft. mounting height and 150 ft. staggered spacing. In each case the view-point is adjacent to a nearside lantern and the reflectivity data is for a rolled asphalt with precoated chippings road surface in worn, dry condition. The contours apply to the road surface from 90 to 360 ft. ahead of the driver, and the modernised installation compares with the Code installation (see Table 2).

(5) Cut-Off Lighting

Unless radical changes occur in road surfacing materials future trends in street lighting practice will be towards cut-off lighting, particularly when higher power sources and closer spacing are used. A 20,000 lm lamp at 30 or 35 ft. mounting height should give acceptable cut-off lighting at spacings of 120 ft. or 140 ft.

(6) Dual Carriageway Lighting

The Code of Practice on Street Lighting treats each carriageway of a dual carriageway road separately, making use of a shared column on the central reservation when the latter is not wider than 12 feet. There are disadvantages in this arrangement, one being the large number of columns in view and another being the extra glare from the lanterns lighting the adjacent carriageway.

Many alternative techniques have been tried, with varying degrees of success. A double row of cut-off lanterns mounted from the central reservation has a streamlined appearance and gives excellent results in dry weather. It relies on light backgrounds to produce brightness along the outer kerbs when the road is surface flooded and if these are absent the lighting is poor.

By using the 20,000 lumen lamp in lanterns giving a non-cut-off, medium angle beam light distribution and arranged in two rows at 35 ft. mounting height and inside the outer kerbs, it is estimated that both carriageways can be lit adequately in wet and dry conditions while preserving a good appearance. The lanterns should be mounted on columns set back some 4 feet behind the kerb, in pairs opposite, at a spacing of the order of 170 feet.

(7) Maintenance of Light Output

The foregoing comparisons are based on the average lumen output of the different types of lamp. The conventional sodium lamp, however, gives some 10 per cent more light during its early life and some 10 per cent less light at the end. The new lamp is more constant in its light output. The lamp engineers' explanation of this is that now that arc tube glasses are relatively non-staining one of the main reasons for the falling off in luminous efficiency is the migration of the sodium, by distillation, to the coolest spot on the arc tube. As soon as the sodium "boils away" from a hot spot the voltage gradient at that part of the arc increases and the distillation rate increases, swamping any diffusion of the sodium back to the zones where it is lacking. These zones, which tend to extend, no longer contribute effectively and the light output of the lamp falls. When "crescent grooving" is employed as in the new type of lamp, the radius of curvature on the inside of the arc tube is quite small at the horns of the crescent. These horns run cooler and at the same time a capillary (or surface tension) effect reinforces their power of sodium retention. When the lamp is new the sodium has not found its way to these niches: some globules are at the hotter points in the arc stream and build up a higher vapour pressure than the optimum, giving a slight reduction in lamp efficiency and wattage; sodium distribution is stabilised during 100 hours of operation and thereafter there is only a slight increase in power consumption during life which is balanced by a slight decrease in efficiency, light output remaining fairly constant. This means that performance of the lighting installation will be more consistent. For the same reason the lamp can be operated with some degree of tilt from the horizontal.

(8) Effect of Tilt

A few degrees of tilt on a long slender lantern is favoured aesthetically and depending on the lantern light distribution, mounting height and the width of the road, it can increase by a small percentage the proportion of the lantern light flux which falls directly on the road surface. Fig. 8 shows the utilisation factor plotted

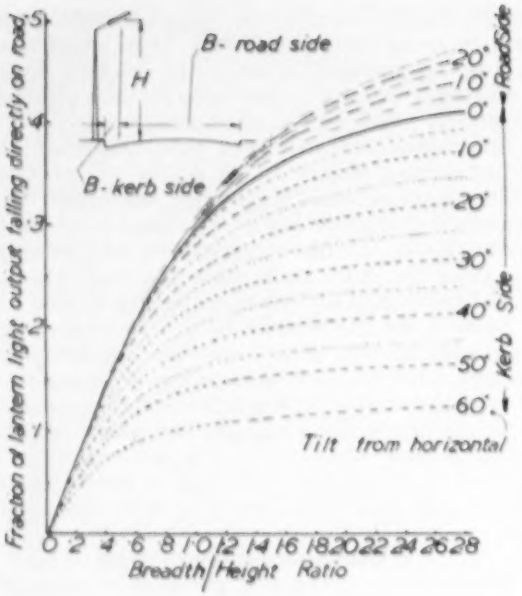


Fig. 8 (left). Curves showing the effect of tilting a lantern on the fraction of the lantern light output falling directly on to the road surface.

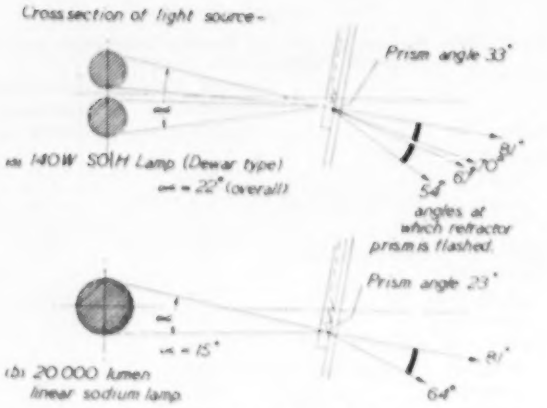


Fig. 9 (above). Part cross-section of lanterns showing effect of light source size on the degree of light control for a given size of lantern.

Table 3

Effect of Tilt on Percentage of Lantern Light Output Falling Directly on Road Surface

B/H ratios ... Kerb side 0.1
Road side 1.3

PERCENTAGE UTILISATION

Tilt angle (degrees)	Kerb side	Road side	Total	Total lower hemisphere Light flux (per cent)
0	4.0	33.4	37.4	92.0
5	4.1	34.5	38.6	91.0
10	4.1	35.0	39.1	90.0
15	4.1	35.4	39.5	88.8
20	4.1	35.7	39.8	88.2
25	4.0	36.0	40.0	88.0
30	3.8	35.7	39.5	86.2
35	3.7	35.6	39.3	84.0
40	3.5	35.3	38.8	82.0
45	3.1	34.8	37.9	79.2

against ratio of road breadth to mounting height (B/H ratio) for various angles of tilt. This enables the effect of tilting to be calculated for various mounting height and road breadth combinations and from this the angle of tilt to give optimum light flux on the road.

The chart is read using the curves for the angle of tilt under consideration. For this lantern the road side and kerb side curves coincide for "no tilt." Road side curves are above the no tilt (0 degree) curve and kerb side curves are those below. Road side curves for angles of greater than 25 degrees are not shown as they fall over the area below the 25 degree curve and would be confusing. If mounting height, overhang to light centre and road width are respectively 25 ft., 2.5 ft. and 35 ft., the values of B/H ratio are:

Kerb side 2.5/25=0.1.
Road side 35 - 2.5/25=1.3.

Utilisation factors are given in Table 3 for various angles of tilt together with the percentage of lantern light output in the lower hemisphere. It will be seen that the change in utilisation for this road is not great: the optimum tilt at 25 deg. puts 6 per cent. more light on the road than horizontal mounting. For wider roads or lower mounting heights the advantage will be greater, but even the widest roads do not benefit from more than 25 deg. tilt. Aesthetically 5 to 10 deg. tilt is most acceptable for roads of about 40 ft. wide.

(9) Light Control

The light from a linear source, mercury, sodium or fluorescent, is re-directed to obtain the required light distribution by means of refractors and/or reflectors which vary from specular to fully diffusing. In the case of the latter the intensity in any direction depends on the illumination on the reflector and the projected area viewed in the given direction. More often specular or preferentially reflecting materials are used as they can be flashed to higher brightnesses and are therefore more effective for a given size of lantern. The effective size of the light source then becomes all important as it determines the angle over which an element of reflector or refractor is flashed.

Fig. 9 compares the section in the plane normal to the lamp axis of the new type of lamp with that of the U-tube lamp. The latter is in effect a double source and unless the refractor designer is careful in staggering his flashing angle a bifurcated beam will result. A compromise has to be made between this and a poor cut-off unless an unduly large lantern is used. Apart from any staggering, the rate at which the change can be made from peak intensity to half peak, to get the desired cut-off characteristic, depends mainly on the angle α of Fig. 9. This can only be reduced for a given size of source by increasing the distance between source and prism, i.e.,

by making the lantern larger. The angle of flashing depends to a limited extent on whether the prismatic face or the smooth face of the refractor plate is presented towards the lamp. British practice favours enclosed lanterns and the majority of sodium lanterns consist of a blown "Perspex" bowl with refractor plates sealed on the inside. If the plate is sealed onto the outside of the bowl or if the prisms are formed onto the inside of the bowl, possibly by injection moulding, the bowl may be made slightly smaller due to the slightly different effect of the prisms.

The best compromise between the present size of lantern, with the improved light distribution to enable the longest spacings to be used, and the smallest cross section that will give light control comparable with present practice, involves economics and will be evolved practically from installation experience.

(10) Conclusions

It will be clear from the above discussion of the properties of this new light source that such a lamp giving 20,000 lm output will be most useful for the purposes outlined, *viz.*,

(1) Higher powered installations at Code spacings and mounting heights.

(2) Improved dual carriageway lighting.

(3) More economical Code-quality installations at longer spacings and increased mounting heights.

(4) Modernisation of pre-Code (150 ft. spacing) installations by using higher powered lamps at increased (30ft.) mounting height.

Lanterns for such a lamp will be longer but can be some 30 per cent shallower and narrower than for the ordinary lamp for equivalent light distribution; closer control of intensities above the beam is desirable and the best compromise is probably to use a better light distribution without the full reduction in lantern cross-section.

(11) Acknowledgments

The writer acknowledges with gratitude permission from the Director of Road Research, D.S.I.R., to make use of unpublished data on road surface reflectivity characteristics, and help from colleagues in the A.E.I. Lamp and Lighting Co. Ltd.

(12) References

(1) Weston, R. F. "High Output Sodium Lamps," *Electrical Times*, May 7th, 1959.

(2) Davies, L. J. and Lucas, G. S. C. Paper on "Road Illumination" to the Institution of Automobile Engineers, 1939.

(3) De Boer, J. B., Burghout, F. and Van Heemskerck Veeckens, J. F. T. Paper on "Appraisal of the Quality of Public Lighting." C.I.E., 1959.

(4) Ives, H. E. "Visual Diffusivity." *Philosophical Magazine*, Vol. XXXIII, 1917.

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(6) Ruff, H. R. and Lambert, G. K. Paper on "Relative Importance of the variables controlling Street Lighting Performance." A.P.I.E. Conference, 1957.

Lighting Abstracts

OPTICS AND PHOTOMETRY

535.241.4 : 621.327.534.15

729. Method of calculating the luminous flux from reflector fluorescent lamps and from fluorescent lamp fittings.

B. STECK, *Lichttechnik*, **11**, 269-270 (*May*, 1959). *In German.*

It has been found that the polar curve of luminous intensity in a plane containing the axis of a fluorescent lamp can be well represented by the expression $\frac{1}{2}I_0$ (cos α + cos^2 α) where I_0 is the intensity at right angles to the lamp and α the angle from this normal. This expression is usually correct to within about 3 per cent for lamps in the open or in open reflectors. For louvre fittings the distribution is more nearly represented by $\frac{1}{2}I_0$ (cos^2 α + cos^3 α). Given the polar curve in a plane at right angles to the axis of a lamp or fitting, the total flux can be obtained by a simple summation of products based on the appropriate cosine expression. The method is illustrated by applying it to a reflector fluorescent lamp. J. W. T. W.

535.34

730. Researches on the transmission of light by haze and fog.

A. ARNUF, J. BRICARD, E. CURE and C. VERET, *Revue d'Optique*, **8**, 105-113 (*Mar.*, 1959). *In French.*

The paper records results of a long series of research begun in 1935. Measurements of the spectral attenuation of fogs and hazes were made both by transmissometer and by determinations of the luminance of distant black objects in terms of the horizon luminance, using the Koschmieder equation. Measurements were made of transmission over the range of wavelengths from 0.3 to 10μ. For the transmission measurements a transmissometer was used employing autocollimating mirrors at different distances. The attenuation coefficient was also derived by measurements based on Koschmieder's equation using a visual telephotometer and a series of black targets at various distances, over the spectral range 0.4-0.6μ. In 80 per cent of the comparisons the agreement was better than 30 per cent. The constitution of the fogs and hazes was examined using a granulometer of the Dessens type in which droplets are collected on fine spiders' webs. Distributions of sizes are given and the optical properties calculated from them compared with the observed properties. There was no evidence of absorption by solid particles in the samples measured. Equivalent monodisperse aerosols were calculated for the three types of aerosol. J. M. W.

LAMPS AND FITTINGS

628.971.6

731. Design and evaluation of high utilisation fluorescent street lighting luminaire.

D. E. HUSBY, *Illum. Engng*, **54**, 259-263 (*May*, 1959).

A study has been made, using a length of test road, of the advantages of mounting fluorescent luminaires parallel to, rather than at right-angles to, the roadway. Provided proper reflector and refractor control of the light distribution is ensured, then it is claimed that parallel mounting has advantages in terms of increased utilisation combined with reduced source luminance at near-horizontal viewing angles. Other advantages include improved uniformity of illumination, improved daytime appearance and reduced pole stresses. P. P.

628.971

732. Some practical considerations in the design and manufacture of neon signs.

A. URQUHART, *Trans. Illum. Eng. Soc. (London)*, **24**, 53-68 (*No.* 2, 1959).

The use of neon signs (a generic term embracing all high voltage illuminated signs and displays) for advertising and decorative purposes is no longer regarded with prejudice. This changed attitude has been largely brought about by the careful attention to design, the evolution of new colours, the development of more reliable lamp manufacturing techniques and the adoption of new materials, including acrylic plastics, in recent years. The stages in the design, construction, installation and operation of a neo sign are dealt with, using as an example the "Coca-Cola" sign in Piccadilly Circus. P. P.

628.978

733. Obstruction lights for high tension lines required for air navigation.

R. CHINCHOLLE, J. LAULIAC and D. KAYSER, *Bull. Soc. Franc. Elect., 7th series*, **9**, 176-193 (*April*, 1959). *In French.*

A series of three papers outlining the possibilities of providing obstruction lights on the towers and conductors of high tension lines. Where a convenient low tension network exists obstruction lights using tungsten lamps in preferably cold cathode lamps can be provided. Where no low-tension network is available, and particularly on the conductors themselves, there are various possibilities of feeding the lamp from the high tension supply, which are reviewed. The preferred solution is to provide an inductor consisting of an auxiliary conductor some metres long close to but insulated from one conductor, and to connect the lamp between the conductor and the auxiliary, in series with a resistance. The second paper discusses the theory of the system, and the third describes the practice with illustrations. A further possibility provides for a rectifier and capacitor between the auxiliary conductor and the lamp, whereby a flashing indication can be obtained. Steady intensities of red light of 10 to 24 cd. are obtained under various conditions. J. M. W.

621.327.9

734. New source of radiation: the metal high-pressure lamp.

R. ROMPE and A. IHLN, *Lichttechnik*, **11**, 328-9 (*June*, 1959). *In German.*

Describes a new form of discharge lamp in which the gas (argon, krypton or xenon) is at a pressure of 10 or 20 atm. when cold. The hollow electrodes are water-cooled and 3 mm. apart. Most of the lamp is of brass but the arc is enclosed in a hard glass cylinder. Ratings range from 1 to 4 kW and the life of a 3 kW lamp is some 75 to 100 hours. The luminance is of the order of 50,000 cd/cm^2. The lamp can only be operated on d.c. J. W. T. W.

628.946

735. Light concentration from fluorescent lamps by means of mirror reflectors.

D. FISCHER and C. H. ZIESENISS, *Lichttechnik*, **11**, 271-273 (*May*, 1959). *In German.*

A theoretical investigation of the light distribution from trough mirror reflectors of various forms used with fluorescent lamps. Two of the contours used were circular, one

parabolic and one straight-sided. It was found that the maximum luminous intensity was greatest for the parabola, but one of the circular sections gave a very similar result. With the straight-sided section the concentration was much weaker. With the parabolic section the greatest concentration was obtained when the axis of the lamp coincided with the focal line of the parabolic trough. J. W. T. W.

LIGHTING

628.93

736. Prediction of illumination under downlights.

I. Goodbar, *Illum. Engng*, **54**, 237-251 (*April*, 1959).

Illumination design using highly directional downlights has been greatly simplified by means of a new point-by-point calculation technique which avoids arithmetical operations. The technique employs a series of charts, one for each spacing: mounting height ratio, which are superimposed on a polar diagram of the luminaire concerned. Three values read from these charts give the relative illuminations verticaly beneath the luminaire, midway between two luminaires and in the centre of four luminaires, the luminaires being assumed to be located on a square grid. A separate chart enables these relative values to be converted to actual illumination levels. The theory of the charts is dealt with in an appendix. P. P.

628.92

737. Analogue and digital computer solutions of daylighting problems.

P. F. O'Brien and J. A. Howard, *Illum. Engng*, **54**, 177-185 (*March*, 1959).

Three typical room interiors are employed to demonstrate the use of analogue and digital computers for the prediction of indoor daylighting levels. With either type of computer, solutions are required to a number of finite difference equations, these equations demanding a knowledge of a series of shape moduli determining the interreflection characteristics of pairs of room surfaces. The accuracy of an electrical analogue known as a luminous analogue computer has been tested by examining a particular kind of fenestration and louvre system for which measurements in model-scale rooms were already available. P. P.

628.971

738. Lighting installation for the Brageröen sports track in Drammen.

R. Stromme, *Ljuskultur*, **31**, 33 (*Jan.-March*, 1959). *In Norwegian.*

An open air ice arena has been illuminated by suspended units of 1,500-watt filament lamps uniformly distributed. The illumination level is from 9 to 12 lm/ft². Constructional and mounting details are given and illustrated. R. G. H.

739. New lighting in two Stockholm shops. 628.972

S. O. Olsson, *Ljuskultur*, **31**, 27 (*Jan.-March*, 1959). *In Swedish.*

A new type of large surfaced low brightness fitting built into the ceiling has been employed in a fashion house (Anglais Mode). The opal plastic diffuser can be easily removed to give access to the 40-watt fluorescent tubes. The average illumination is 100 lm/ft². Back lighting through coloured opal plastic is also used in one department where the decorations and furniture are all white. In John Walls electrical and mechanical equipment store the ceilings have been lowered and the same inset ceiling units as in Anglais Mode. R. G. H.

628.971.6

740. A demonstration laboratory for roadway lighting.

R. M. Swetland and K. D. Tobin, *Illum. Engng*, **54**, 265-271 (*May*, 1959).

In order to study and demonstrate various systems of street lighting on a full-scale, a "Crossroads of Light" has been built at Hendersonville, North Carolina. This comprises four intersecting roads of 25 ft. (residential), 50 ft. (arterial) and 70 ft. (retail business and "white-way") widths, surfaced partly with concrete and partly with asphalt, and incorporating as many as 140 luminaires in 36 different combinations of luminaire type and spacing. Studies of luminaire orientation and mounting height, discomfort glare, roadway reflectance, visibility in fog and preferred illuminant colour are being currently carried out. P. P.

628.971.6

741. Theoretical and practical light distributions for roadway lighting.

A. W. Fowle and R. L. Kaercher, *Illum. Engng*, **54**, 277-286 (*May*, 1959).

Adequate "visibility distance," the distance at which an object of given size and contrast can just be detected, is considered to be the basic end result sought for in good street lighting practice. It is dependent on a number of factors, including the level and uniformity of the horizontal illumination. These are related only to the physical characteristics of the lighting installation and can consequently be computed mathematically. An alternative approach in street lighting design is to commence with an assumed level and uniformity for the horizontal illumination and derive the polar distribution for a given spacing and mounting height of luminaire. The distribution is influenced by such factors as disability and discomfort glare, which impose limitations on the luminaire candlepower at low viewing angles. P. P.

628.971.6

742. Computation of relative comfort and relative visibility factor ratings for roadway lighting.

C. H. Rex, *Illum. Engng*, **54**, 291-310 (*May*, 1959).

The seeing requirements for satisfactory night driving depend on visual comfort, visibility and driver alertness. Relative comfort and visibility ratings as experienced by an observer driving along a hypothetical street-lighting installation have been worked out, the data being presented in the form of numerous graphs and tables. In performing the calculations, account has had to be taken of the different luminance patterns presented to the observer from each position on the roadway, their effects on the instantaneous values of the relative comfort and visibility ratings being computed accordingly. P. P.

743. The artificial lighting of plants. 628.979

R. C. Geslin, *Bull. Soc. Franç. Elec.* 7th Series, **9**, 350-362 (*June*, 1959). *In French.*

A general review of the use of irradiation of plants by visible and near-visible radiation, giving the requirements and methods. The need for a unit based upon the curves for phototropism and photosynthesis rather than on vision is stressed. Lamps used are described; the fluorescent "de luxe daylight" type has a particularly suitable spectrum. Examples are given of lighting for greenhouses, underground growing houses and research establishment; also of the use of light for irradiation and display of flowers indoors. J. M. W.

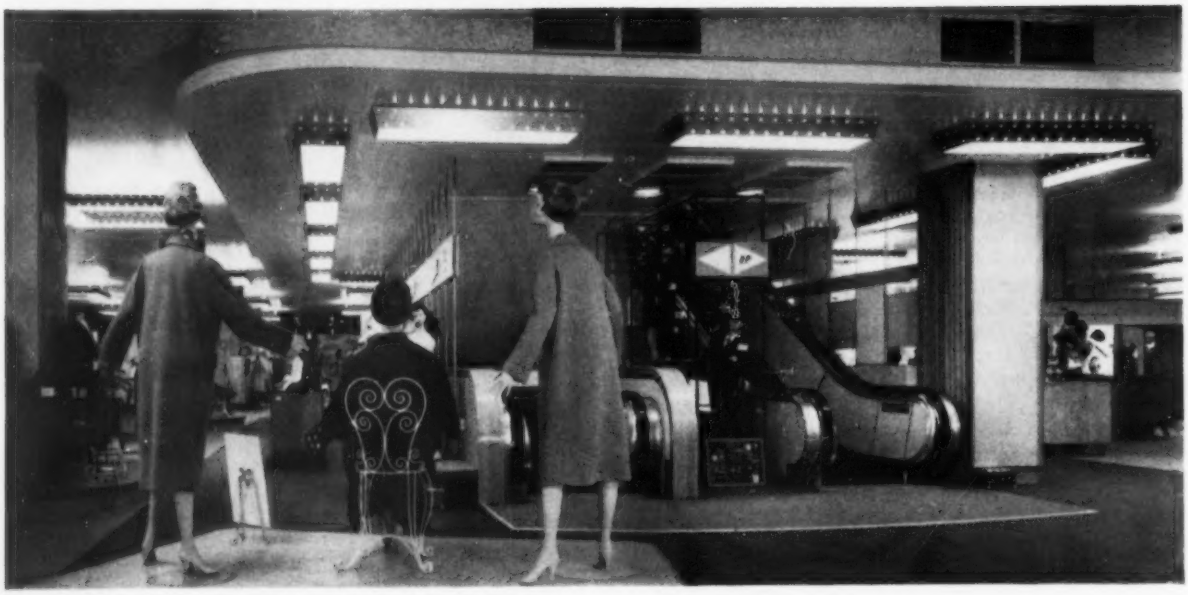
LIGHTING INSTALLATIONS

The Bazaar, Knightsbridge

Fashion shop designed by the Conran Design Group (chief assistant, John Bitmead). Mezzanine offices and display area, with changing cubicles below. Focal point is large display counter seen in picture, with centre section glass-covered. Above hangs cluster of thirty-five 40-watt pearl lamps, with lamp-holders covered by brass sleeves. Main lighting from banks of fluorescent lamps above undulating false ceiling of pine slats. More fluorescent lamps concealed by uprights and fascias of storage units along side walls.

Edwin Jones, Southampton

With floor area of 309,000 sq ft, the new Edwin Jones Store (architects, Healing & Overbury, in collaboration with Alan C. Parnell), is one of the largest on the south coast. It stands on the site of the firm's old premises destroyed by German bombs. Three-storey building includes restaurant, cafeteria, self-service grocery department, and fashion show "theatre." Decor features use of three specially created patterns of "Formica" for counter fronts throughout. Sales floor lighting mainly by suspended fittings, in form of hollow square, each housing eight 5 ft. fluorescent lamps. Matching fittings, as in fashion department (below), house two lamps. Bronze finish metal sides of fittings pierced by holes the shape of a crown—the store motif. Control gear concealed above false ceiling. Installation (by Alldridge) on earth-concentric system (with copper sheathing acting as earth return) said to have saved half the cost of conventional installation.



MISCELLANEOUS

Vactric Showrooms, London, S.W.1

New headquarters of Vactric Ltd. (architect, Ronald Fielding, ARIBA), occupy a recently-completed five-storey building in Sloane Street, developed in accordance with Vactric's requirements by the Legal and General Assurance Society Ltd. Ground floor includes showroom (left) featuring unusual display lighting seen in background. This comprises a bank of no fewer than 60 spotlights with spun-metal reflectors, each housing a 100-watt lamp. General lighting from 200-watt louvred downlights; extra light from showcases with fluorescent lamps concealed by letter-pierced pelmets. (Installation and fittings, Troughton & Young Ltd.)

Shoe Showrooms, Street, Somerset

Showrooms of C. & J. Clark Ltd. are housed in reconstructed wing of 19th century premises, originally the home of the founder of the company. Decor features extensive use of leather, suede, polished hardwood and stainless steel, contrasting in area illustrated (entrance and reception room) with wall on right of rough hewn masonry and wall on left covered with coarse textured fabric. L-shaped area of suspended ceiling conceals fluorescent lamps, other lamps being concealed by saw-tooth arrangement of suede-covered end wall panels. Spotlights are deeply recessed into the ceiling and an eye-catching feature is the row of display pedestals. Each shoe is lit by a lamp housed in the stove-enamelled spun-metal cone that hangs above it. (Architects, C. Roy Beecroft & Partners, in collaboration with Henry Philp, of C. & J. Clark.)

LIGHTING INSTALLATIONS ..... MISCELLANEOUS (cont.)

Conference Room, Kuwait Oil Company

New headquarters of the Kuwait Oil Company occupy 56,000 sq ft of a vast office building in Wigmore Street, London, W.1 (architects, C. H. Elsom & Partners). The offices provide accommodation for a staff of 300, and include an exhibition room, reception areas on each of the eight floors, directors' luncheon room and the conference room illustrated on the left. General light from fluorescent lamps concealed above canopy suspended over conference table. Light for the table comes from row of four semi-recessed downlights fixed to this canopy, each housing a 150-watt tungsten lamp. More semi-recessed downlights in lowered ceiling on left supplement general lighting in this area; fully-recessed downlights light end wall on which hangs portrait of Sheik of Kuwait.

Reception/Display Area and Studio

Design studio (below) and reception/display area (right) separated by storage unit and display screen. Designed by W. M. de Majo, MBE, FSIA, for Transparent Paper Ltd., with the display section serving also as a testing area where artists and clients can assess, compare and evaluate experimental designs for printing on cellulose film. Studio lighting comprises suspended louvred fittings, each housing a 150-watt tungsten lamp fitted with a half-round spun-aluminium reflector. This general lighting is supplemented by an "Anglepoise" table lamp on each desk. Lighting in reception/display area includes similar tungsten fittings, together with units (not seen in these pictures) housing fluorescent lamps of various colours, rheostat-controlled so that almost any condition of artificial lighting to be found in shops and stores can be simulated. This enables the artists to take into account colour distortion at point of sale, resulting from bad or unusual lighting.

PHILIPS

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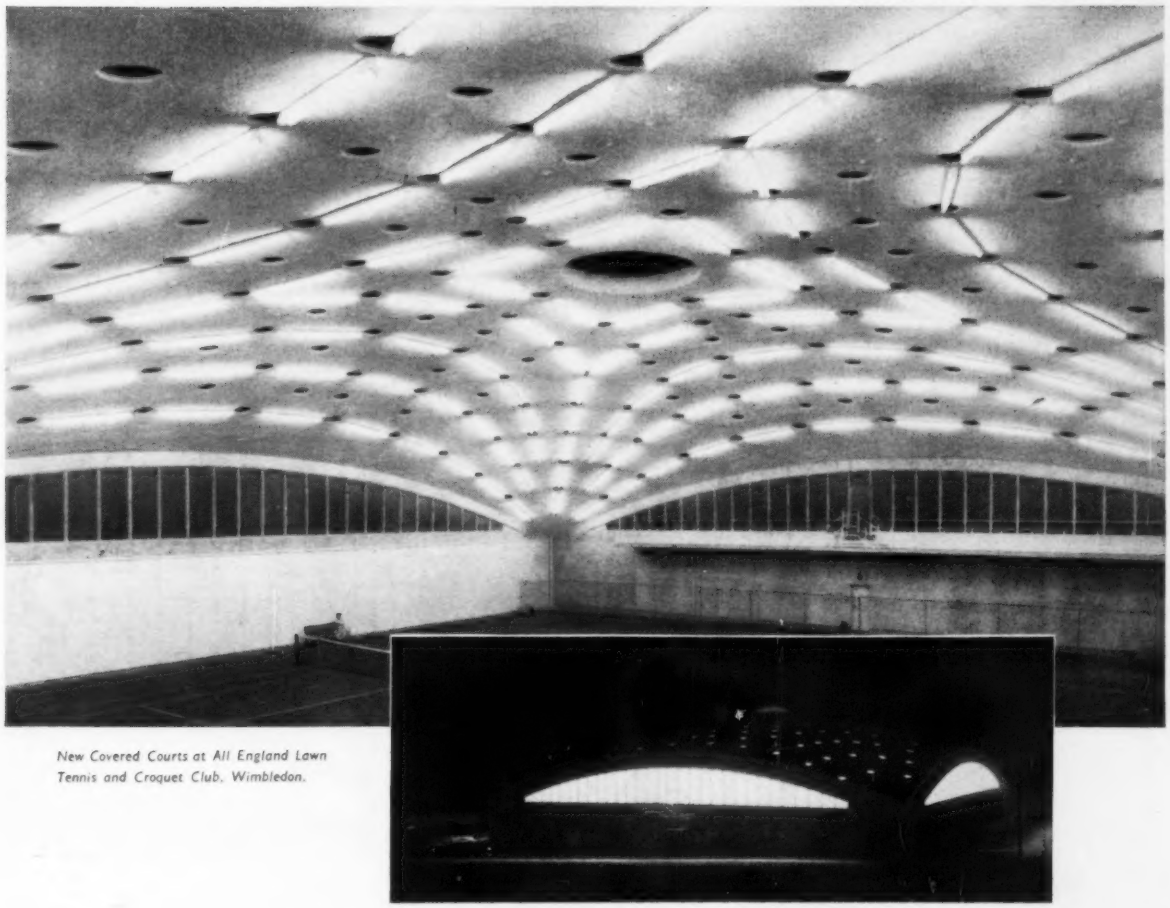

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The Philips Lighting Design Service offers comprehensive expert advice from a team of experienced lighting engineers and a qualified architect who has made a special study of light in relation to colour – all this, *without charge or obligation*. The service has, since its inception, been responsible for many of the most imaginative lighting schemes devised in recent years. You can avail yourself of it simply by asking your electrical contractor or getting in touch with Philips direct.

PHILIPS ELECTRICAL LTD *LIGHTING DIVISION*

CENTURY HOUSE · SHAFTESBURY AVENUE · LONDON · W.C.2
(LD3129)

NEW PRODUCTS

Decorative tungsten fittings

Falks first showed their "Olympus" decorative contemporary fittings at the Electrical Engineers Exhibition earlier this year; the complete range is now available and some examples are illustrated below. The same satin finished opal stepped glassware is used in each of the fittings. The metalwork which in most cases rests upon the projection formed in the glassware is finished in either red, or black, or red/white or black/grey. Full details with illustrations in colour are given in a leaflet.

Falk, Stadelmann & Co. Ltd., 91, *Farringdon Road, E.C.*1.

"De Luxe Natural" fluorescent tube

A new "De Luxe Natural" fluorescent tube has been introduced by Atlas Lighting and Ekco-Ensign. This new tube has remarkable colour rendering properties which open up a completely new field for fluorescent lighting. Red colour rendering is at least equal to that of an incandescent lamp and sufficient energy is emitted in the violet-blue-green region to match the cool effect of natural daylight.

At present provision stores find it necessary to display foods under a mixture of fluorescent and tungsten lighting. It is claimed that the "De Luxe Natural" tube makes this unnecessary. An important point is that the colour "appearance" of the new tube is very close to natural in that it gives a cool white appearance. This is an important psychological factor in giving the impression of cleanliness and freshness which is so desirable in food stores. At the same time the hidden red emission of the "De Luxe Natural" tube avoids the "cold" impression of other cool white tubes, particularly at the high illumination levels used today. The tube is available in 8 ft., 5 ft. and 4 ft. sizes.

*Atlas Lighting Ltd., Thorn House, Upper St. Martins Lane, W.C.*2.

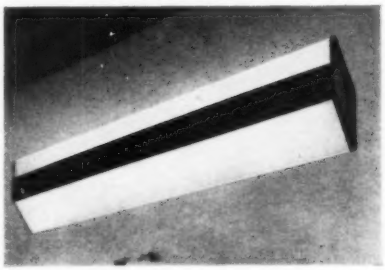
Ekco-Ensign Electric Ltd., 25, *Essex Street, W.C.*2.

"Brite-Glo" ceiling

The Courtney, Pope "Brite-Glo" packaged ceiling in its standard size of 6 ft. by 4 ft. has attracted considerable attention since its introduction a few months ago. A smaller version on a 6 ft. by 2 ft. framework has now been introduced (see illustration below). In this a single fluorescent fitting is attached to the ceiling and the framework suspended by chains from the fitting. The price of the "Brite-Glo Junior" is £9 18s. 2d.; the standard fitting costs £18 17s. 2d.

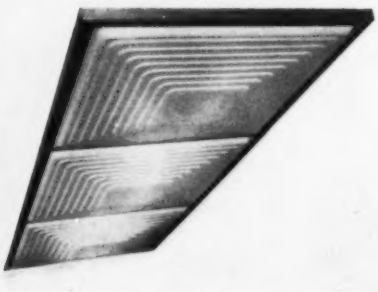
*Courtney, Pope (Electrical) Ltd., Amhurst Park Works, Tottenham, N.*15.

A swinging-arm adjustable wall light by Cone Fittings Ltd. The lamp can be swung into any position in a 3-ft. radius hemisphere. It has no springs or friction mechanism and relies solely on balance weight. Price is £7.15s. inc. tax.

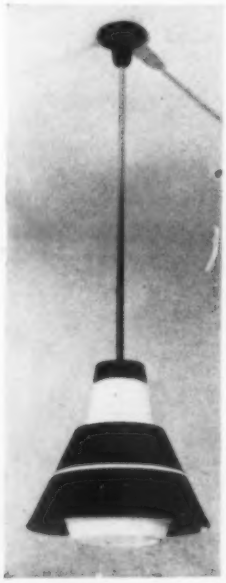


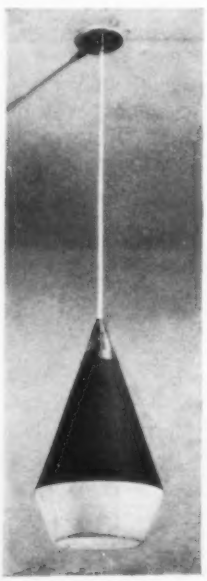
S.L.R. Electric Ltd. "Linaire" wall fluorescent fitting. Models are available for 4-ft. and 5-ft. fluorescent lamps.

Courtney, Pope "Brite-Glo Junior"



Examples from Falks "Olympus" range.





Siemens "Vitalite"

Siemens Edison Swan Ltd. are developing a new technique for banishing what they describe as "tired lighting" in offices, factories, and schools. To do this a new interior lighting fitting called the "Vitalite" has been designed to give a continuous variation in light output consistent with natural daylight conditions. The fundamental operating principles of the "Vitalite" are simple. An aluminium reflector mounted on bearings below the fluorescent tube in the fitting is connected to a synchronous electric motor which turns the reflector through one revolution every hour. In the first 15 minutes the intensity of light distribution below the tube increases gradually to the maximum value, and at the end of the following quarter of an hour it returns to the minimum level once more.

Siemens Edison Swan Ltd., 38-39, Upper Thames Street, London, E.C.4.

Atlas "Super Slim Popular Pack"

After sales totalling over a million, the Atlas "Popular Pack" fluorescent fitting has now appeared in a new slimmer and lighter form and at a lower price. The new fitting (the super slim Popular Pack) has a very slim chassis, made possible by a new design of control gear, and is available in 8 ft., 5 ft., 4 ft. and 2 ft. sizes. Although normally provided for use on 230/250 mains supply, 200/210 or 220 volt versions are also available. It is a completely enclosed fitting with the cover plate removing easily from below for access to all wiring and control gear. Spring-loaded bi-pin lampholders of new design are used throughout the series. They are robustly but simply constructed, permit speedy removal or replacement of the tube from either end, and give a positive grip on the tube. Examples of price reductions are the 8 ft. batten from £8 10s. to £7 7s. 6d. and the 5 ft. "Perspex" diffuser from £10 6s. to £7 15s.

A series of four reflector and diffuser attachments are available with the new "Popular Pack" and can either be purchased separately or complete with the chassis and tube. They include an open end metal trough reflector (8 ft. or 5 ft.) with upward facing slots for a wide range of industrial applications; a one-sided angle metal trough reflector for the 5 ft. fitting; a translucent, closed-end opal "Perspex" trough intended primarily for use in industrial premises where a greater degree of upward lighting is required and for situations where corrosion-resistant reflectors are desirable; and for display and general commercial use, a diffuser in extruded "Diakon" with blue plastic end panels is available.

Atlas Lighting Ltd., Thorn House, Upper St. Martins Lane, W.C.2.

Benjamin "Duoflux" Floodlight

The Benjamin Electric Ltd. advise that their "Duoflux" overhead floodlight which they have manufactured for many years has now been modified to bring it into the "Model Fifty" range of fittings, announced earlier this year. Re-styled castings, particularly the pole top, improve appearance and provide more room for carrying the interior cables into the hood casting which are now die-castings instead of sand-castings and thus give a much better finish. Provision is now made for terminating mineral insulated copper sheaf cables which are extensively used for outdoor situations, particularly where inflammable spirits are stored. Provision has also been made for adjusting the position of the lampholder to suit different size lamps so that one fitting now covers the 500 to 1,500-watt lamp range. The floodlight can be supplied with or without inner reflector. It is still finished in "Crysteel" vitreous enamel, white inside and green outside.

Benjamin Electric Ltd., Brantwood Road, Tottenham, N.17.

Display spotlight

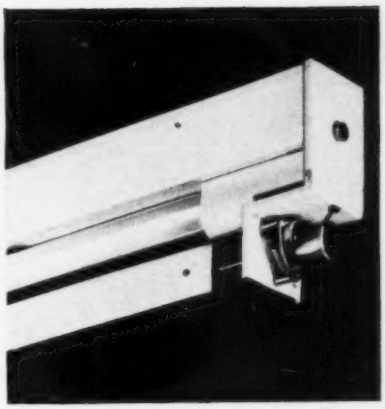
C. M. Churchouse have recently introduced their "Rotaspot" fitting which can be fixed to any horizontal or vertical surface for display lighting in shop windows, display cases, etc. The base is constructed so that the fitting will stand on its own with the reflector at any angle. It is made in two sizes, for 75-watt reflector spot lamps (price 38s. 4d.) and 150-watt (45s.).

C. M. Churchouse Ltd., Clarendon Works, Clarendon Cross, W.11.

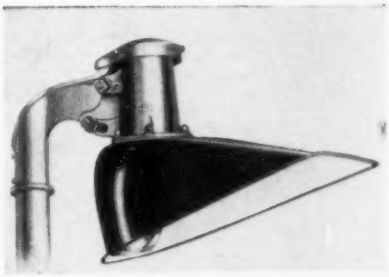
Anti-corrosive fittings

A new range of anti-corrosive fluorescent fittings has been introduced by Simplex Electric Co. Ltd. for fixing in slaughterhalls and workrooms to meet the requirements of the new slaughterhouse regulations on lighting. The fittings are protected by a special process to prevent rust and can be simply hosed down when cleaning generally.

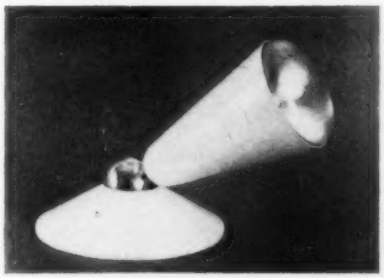
Simplex Electric Co. Ltd., Blythe Bridge, Staffs.



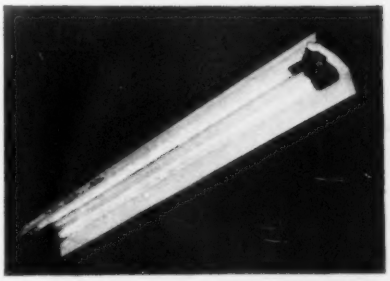
End part of a fluorescent "Vitalite" fitting showing aluminium reflector and synchronous motor.



The re-styled Benjamin "Duoflux" floodlight.

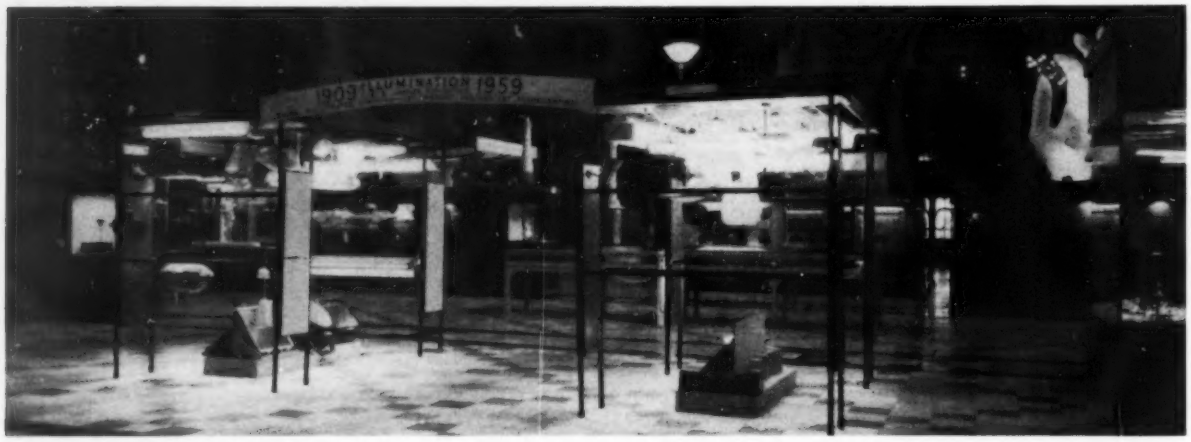


The Churchouse "Rotaspot".

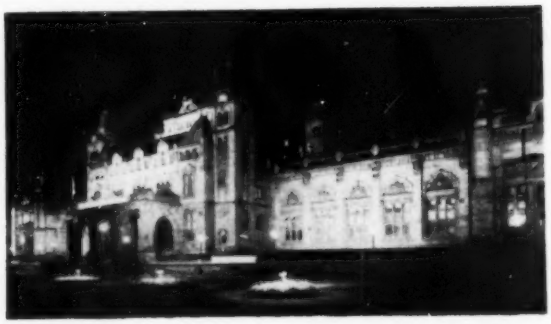


The Simplex anti-corrosive fluorescent fitting.

Recent IES Golden Jubilee Activities

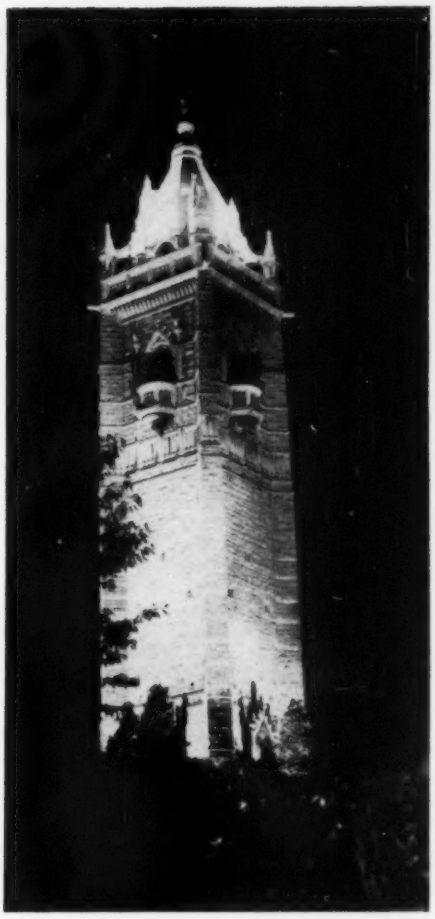


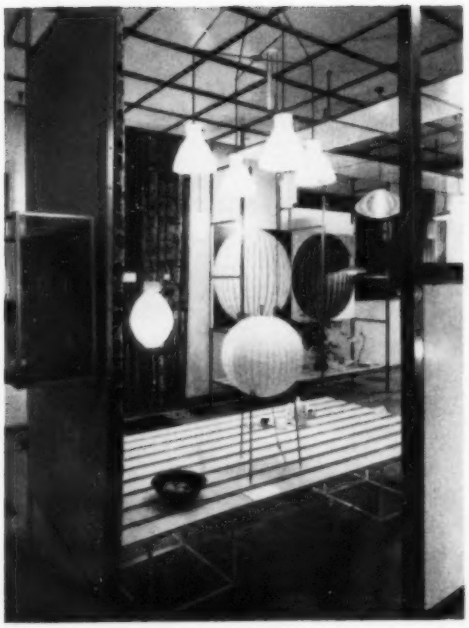
The above picture gives a general view of the very successful lighting exhibition held from September 1st to 21st at the Kelvingrove Art Galleries and sponsored jointly by the Glasgow and Edinburgh Centres of the IES and the Corporation of Glasgow Art Galleries and Museum Committee. Some early forms of lighting were shown but the bulk of the exhibits were of present day lamps and lighting equipment with sections including stage lighting, shop lighting, a TV studio, a display of modular ceilings, street lighting and the use of plastics in lighting. The total number of visitors during the three weeks of the exhibition was 49,012; distinguished visitors included HE the Swiss Ambassador, HE the Austrian Ambassador, the High Commissioner for New Zealand, and Sir Robert McLean, Chairman of the Scottish Industries Exhibition. The small picture on the right shows the IES Jubilee symbol which was prominently displayed. The picture below shows the exterior of the Art Gallery which, together with the flower beds in front of the building, was floodlit throughout the exhibition.



An exhibition aimed at making the IES better known in its area was arranged by the Leeds Centre at the end of August at a school near the centre of the city. It was opened by the Lord Mayor of Leeds who is seen in the picture on the left at the 'light tester' where she selected an illumination of 100 lm/ft² as the best to read by. The exhibition included examples of a wide range of lighting equipment and different kinds of lighting. The Leeds Chamber of Trade and many local firms co-operated in providing furnishings for specimen rooms and for shop window displays, and a number of departments of the Corporation and the Yorkshire Electricity Board supplied exhibits in addition to those supplied by Sustaining Members of the Society.

The proposals of the IES Bath and Bristol Centre to floodlight Brandon Hill in Bristol stimulated the City authorities to arrange additional floodlighting as part of the Brunel centenary celebrations which happened to coincide with the IES Golden Jubilee. As a result many well known buildings and the famous Clifton Suspension Bridge were floodlit during September. The picture on the far right shows the Cabot Tower which was lit by the Society: the other two pictures show the tower of the University and the Suspension Bridge.





These two pictures are of parts of the display 'Lighting your Home' which is currently running at the Design Centre in Haymarket and which has been arranged in association with the IES. A selection of good modern lighting fittings is shown and there are two settings which illustrate the correct placing of lighting points in a room. The display will be open until November 7.

IES Vice-Presidents and Regional Chairmen 1959-60

VICE-PRESIDENTS

F. A. Benson

Dr. F. A. Benson, DEng, PhD, AMIEE, MIRE, FIES, graduated at Liverpool University after which he joined the research staff of the Admiralty Signal Establishment and became an Assistant Lecturer in Electrical Engineering at the university. He is now a Senior Lecturer in Electrical Engineering at Sheffield University. He is the author of four books and over seventy technical papers.

A. H. Olsen

Mr. A. H. Olsen, ACGI, FIES, after training at the City and Guilds, took a college apprenticeship at Metropolitan-Vickers at Trafford Park. After service with REME during the war he started the firm of Courtney, Pope (Electrical) Ltd. of which he is now managing director and a director of the associated group of companies.

W. E. Rawson-Bottom

Mr. Rawson-Bottom, MBE, FIES, joined Allom Bros. in 1908 becoming works manager after the 1914-18 war. In 1934 he formed his own company to make special fittings. He joined the Ministry of Works in 1940 where, until he retired recently, he was Illumination Engineer. He has made a special study of lighting in museums and art galleries.

W. S. Stiles

Dr. W. S. Stiles, OBE, DSc, FIES, FRS, is a Deputy Chief Scientific Officer at the NPL which he joined in 1925. He has worked on many problems of photometry and lighting including glare and the evaluation of its effects, and has made extensive studies of visual response by psychophysical methods. He was general secretary of the CIE from 1920 to 1931.

D. L. Tabraham

Mr. D. L. Tabraham, MA, FIES, is Manager of the Lighting Fittings and Illuminating Engineering Departments of the GEC Ltd. He joined the GEC Research Laboratories in 1935 and later served in the IE Dept. under R. O. Ackerley. Before his present appointment he was manager of the company's lighting departments in the north-east.

REGIONAL CHAIRMEN

Bath and Bristol

Mr. J. H. Munns joined Benjamin Electric Ltd. in 1931 in London moving to Siemens in Leeds as a junior lighting engineer in 1936. After service with the RAF during the war he returned to Siemens for two years in London. Since 1949 he has been with Ekco-Ensign Electric Ltd. and is now their SW Area representative.

Birmingham

Mr. J. R. Yeates has been in the electrical industry since 1921. He first became interested in lighting techniques in 1945 when he joined Siemens Electric Lamps & Supplies Ltd. He was appointed Manager of his company's branch at Bristol in 1949, and for the past nine years he has been Manager in Birmingham for Siemens Edison Swan Ltd.

Cardiff

Mr. A. J. Dalton, AMIEE, is Chief Commercial Engineer to the South Wales Electricity Board. He joined Newcastle upon Tyne Electricity Supply Co. Ltd. in 1913. In 1936 he joined Milford Haven UDC as Electrical Engineer and Manager and in 1948 was put in charge of the low voltage supplies section of the SWEB becoming Deputy CCE in 1956.

Edinburgh

Mr. G. R. N. Chalmers was educated at Alan Glen's School, Glasgow, and the Heriot-Watt College, Edinburgh, where he took the HNC in electrical engineering. After an apprenticeship and experience in electrical contracting he joined the MOW engineering design staff. He transferred to his present post with the SE Regional Hospital Board in 1951 in charge of the electrical design section.

Hull

Mr. T. H. Bradley, MIEE, AMIMechE, MIHVE, received his early training in Derby with Rolls Royce and Jerram & Co. Ltd. In 1937 he took an appointment under the Borough Engineer of Bolton. In 1946 he was appointed Chief Mech. and Elect. Asst. to the City Engineer of Hull where he has been associated with many reconstruction projects.

Leeds

Mr. A. J. Johnson joined Siemens Bros. & Co. Ltd. Woolwich, immediately after the first World War. In 1922 he was transferred to the Leeds Branch as senior representative and took over the duties of District Office Manager in 1941, the position which he still holds with Siemens Edison Swan Ltd. He was a founder member of the Leeds Centre in 1937.

Leicester

Mr. E. W. Freeman is Chief Electrical Engineer for N. Corah (St. Margaret) Ltd. He received his early training with Gent & Co. and at the Leicester Technical College and Leicester Vaughan College. He is a past chairman of the Leicester and District Industrial Accident Group and immediate past president of the Leicester Electrical Society.

Liverpool

Mr. W. J. Forster joined the staff of the Stoke-on-Trent Corporation in 1922. He worked with various municipalities throughout the country and in 1940 was appointed Deputy Borough Electrical Engineer and Manager at Walthamstow, and in 1946 Borough Electrical Engineer and Manager, Wallasey. He is now Commercial Officer of No. 1 Sub-Area of the Merseyside and North Wales Elec. Bd.

Manchester

Mr. E. J. Smith is Chief Lighting Engineer of the Manchester Branch of Philips Electrical Ltd. He has had long association with the IES and was for four years Secretary to the Leeds Centre of the Society. He has a varied knowledge of the industry, having been concerned with the design, manufacture, and installation of most types of lighting fittings. He has given several lectures to the Society.

Newcastle

Mr. B. Wray, AMIEE, DipMIES, began his electrical engineering experience by serving a five years' apprenticeship. After the war he completed his technical training at Rotherham College of Technology and Art and joined British Railways as a lighting design draughtsman. Since 1950 he has been area illuminating engineer for Philips Electrical Ltd., at Newcastle.

Nottingham

Mr. D. R. M. Hornsey, who is now Nottingham Area Manager of the AEI Lamp & Lighting Co. Ltd., began his career in the lighting field in 1931 with Crompton Parkinson & Co. Ltd. at Leeds. He joined the British Thomson-Houston Co. Ltd. in 1936 at Sheffield and moved to Nottingham in 1953. He was born at Tadcaster, and went to Tadcaster Grammar School.

South Africa

Mr. H. L. Roston, Dipl-Ing, AMIEE, M(SA)IEE, was born in Germany in 1905 and in 1928 after receiving his university degree went to the USA where he held a position with the Western Electric Co. In 1933 he was appointed Assistant Engineer with the AEG Engineering Co. in South Africa. He is now a consulting engineer.

North Lancashire

Mr. A. E. Sanchez received his early training with the Telegraph Department of the Lancashire and Yorkshire Railway at Bolton. He joined the Royal Engineers in 1918 and received further training in electrical and mechanical engineering. He served at home and overseas with the Royal Engineers until 1945 and on retirement joined the Engineering Division of the Ministry of Works.

Swansea

Mr. J. R. Smith, BA, was educated at the Swansea Grammar School and graduated with honours at the University of Wales. After war service he was an Administrative Officer in the Colonial Service in Palestine, Cyprus and Nigeria. He returned to the United Kingdom in 1952 and joined the family business, J. Smith & Son, Swansea, Ltd., of which he is a Director.

Tees-side

Mr. D. Bradshaw completed his early education at the Grammar School, Gateshead, and in 1950 began his career in lighting with the Newcastle branch of the GEC Ltd. After a period at the Research Laboratories and head office he returned to the NE and was appointed manager of the company's lighting department at Middlesbrough in 1956.

IES Forthcoming Events

LONDON

November 10th

"Research in Phosphors," by A. H. McKeag. At the Federation of British Industries, Tothill Street, S.W.1.

CENTRES AND GROUPS

November 3rd

HULL.—"Trends in Lamp Design, 1884-1984," by E. E. Miles. At the Lecture Theatre, Yorkshire Electricity Board, Ferensway, Hull. 6.30 p.m.

STOKE-ON-TRENT.—"New Lamp Developments," by M. J. Wells. At the North Stafford Hotel, Stoke-on-Trent. 6 p.m.

November 4th

EDINBURGH.—"The History of Lighting," by S. S. Beggs. At the Y.M.C.A. Social Room, 14, South St. Andrew Street, Edinburgh. 6.15 p.m.

NEWCASTLE-UPON-TYNE.—"Lighting and Safety in Building Operations and Works of Engineering Construction," by J. Gordon Scott. At the Large Lecture Theatre, Department of Chemistry, Kings College.

November 4/5th

CARDIFF.—"Mine Lighting." Joint Meeting with Mining, Electrical and Mechanical Engineers. November 4th at Bridgend Technical College; November 5th at Glamorgan College of Technology, Treforest.

SWANSEA.—Joint Meeting with Cardiff.

November 5th

GLASGOW.—"The History of Lighting," by S. S. Beggs.

November 6th

BIRMINGHAM.—Jubilee Ball and Reception by the Lord Mayor of Birmingham. At the Council House, Birmingham. 7.30 p.m.

November 10th

CARDIFF.—Jubilee Ball. At the Park Hotel, Cardiff.

November 11th

MANCHESTER.—Annual Dinner. At the Cafe Royal, Manchester. 6.30 p.m.

November 12th

MANCHESTER.—"Lighting for Production," by W. R. Stevens. At the Free Trade Hall, Manchester. 7 p.m.

NOTTINGHAM.—"Illuminated Ceilings," by W. J. Walpole. At the Electricity Centre, Carrington Street, Nottingham. 6 p.m.

November 17th

LIVERPOOL.—"Display Lighting for Shop Windows," by H. H. Bailin.

NORTH LANCASHIRE.—"Looking at Lighting," by A. Wilcock. At the Demonstration Theatre, North Western Electricity Board, 19, Friargate, Preston. 7 p.m.

November 18th

SHEFFIELD.—Jubilee Public Lecture. At the City Hall.

November 23rd

BATH and BRISTOL.—"Lighting for Selling—Techniques of Shop and Store Lighting," by R. L. C. Tate. At Gardiner, Sons & Co. Ltd., Broad Plain, Bristol.

LEICESTER.—"Modern Lighting in Production," by L. E. Gibbs. At the Demonstration Theatre, East Midlands Electricity Board, Charles Street, Leicester. 7 p.m.

LEEDS.—"Polarised Light and its Application," by D. L. Smare. At the British Lighting Council, 24, Aire Street, Leeds 1. 6.15 p.m.

November 27th

GLASGOW.—Luncheon Meeting. At the Bath Hotel, 152, Bath Street.

LEICESTER.—Social Evening. At Coronation Hotel.

November 30th

BIRMINGHAM.—"The Association of Light and Colour," by A. D. Charters. At Regent House, St. Phillip's Place, Colmore Row, Birmingham. 6 p.m.

Situations

Wanted

EXPORT SALES MANAGER, M.I.Ex., M.S.M.A., A.S.E.E., F.B.S.C., intimate knowledge, experience world markets, valuable lighting connections, languages, initiative, drive, integrity, versatile, strong personality, outstanding ability, successful record, top level negotiator, seeks change. Box 609.

EXECUTIVE ENGINEER. 25 years Lighting Industry. With international reputation and contacts seeks position in London area. Box 599.

Vacant

LIGHTING EQUIPMENT DESIGNER—AUSTRALIA

The General Electric Company Ltd. wish to appoint a designer with creative and administrative ability to work in Design Office in Sydney, Australia, required for design of lighting equipment of all types.

Tenacity, keenness and previous experience in this field of design are essential, and a knowledge of architecture and decoration would be an asset.

The post offers attractive prospects and starting salary. Candidates, preferably single, must be prepared to remain in Australia for a minimum of three years.

Applications in writing to the Staff Manager, General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2, stating age and experience.

DRAUGHTSMAN required for interesting work in Lighting Fittings Design Office. Write stating age, salary required and full details of experience, etc., to Box 608.

LIGHTING ENGINEER required for survey and design work on industrial lighting schemes. Age 25-35. Should have had previous experience in these fields. Preference will be given to applicants who have formerly worked for manufacturers or electrical contractors. The work is interesting and should appeal to men of initiative. Salary will be commensurate with applicant's qualifications. Pension and life insurance scheme in operation. Apply in writing, to Personnel Manager, Simplex Electric Co. Ltd., Blythe Bridge, Stoke-on-Trent, N. Staffs.

LIGHTING ENGINEER, capable of planning and negotiating commercial and industrial schemes, required by London Office. Apply to Crompton Parkinson Ltd., Crompton House, Aldwych, London, W.C.2, quoting Reference SSV.

ATLAS LIGHTING LIMITED
require
TECHNICIANS for interesting work in Lamp Development Laboratory situated in North London. Previous experience in lamp making, glass working, high vacuum, or lighting techniques desirable. Applicants aged 20-30 years should write giving full details to:—
WJM/LED,
ATLAS LIGHTING LIMITED,
Angel Factory Colony,
Angel Road,
London, N.18.

DRAWING OFFICE. Experienced man with practical knowledge of manufacturing methods wanted for lighting fittings design team. Pension Fund. 5-day week. Write fully marking envelope "Confidential," Technical Director, Holophane Limited, Elverton Street, London, S.W.1.

Personal

MR. T. R. MANDERSON has been appointed Southern Area Manager for The Benjamin Electric Limited. Before joining Benjamin Electric Ltd. in 1955 Mr. Manderson was with A.E.I. Lamp and Lighting Co. Ltd., as Lighting Sales Engineer in the Architects and Consultants Specification Section.

Recent appointments to the staff of Philips Electrical Limited include the following:—

MR. H. E. CHADWICK has joined the South-East Region of Philips Electrical Ltd., as representative for the Electrical Appliances Division.

Because of the ill-health of MR. N. R. LAW, Branch Manager of the Nottingham Branch, MR. A. B. SKEVINGTON has been appointed to take over the running of the Branch. Mr. Skevington joined Philips, Nottingham, in 1949, and was appointed Area Manager, Electrical Appliances Division in 1957. MR. R. SEERS has succeeded Mr. Skevington as Area Manager, and MR. E. W. CLARKE has taken over Mr. Seers' duties as Lighting Division Representative in Nottingham.

MR. W. J. JONES, M.Sc., M.I.E.E., has been appointed Director of the British Lighting Council. Mr. Jones, who is a past President of The Illuminating Engineering Society, will continue to hold the position of Director of the Electric Lamp Industry Council, but as the time he will be able to devote to that office will in future be limited, Mr. E. J. Counter has been appointed Deputy Director of the Electric Lamp Industry Council.

Trade Literature

EKCO-ENSIGN ELECTRIC LIMITED, 45, Essex Street, London, W.C.2.—A new leaflet giving prices of the company's range of lamps together with general information.

WATERTIGHT FITTINGS LIMITED, Victory Works, 4-10, Newbold Road, Chesterfield.—An illustrated leaflet showing the "Everyman" and "Everyman Plus" fittings. Catalogues E.1010 and E.1414, giving details of the Everyman Plus wellglass fittings, are also available.

POSTSCRIPT By 'Lumeritas'

A NEW publication on the lighting of factories made its appearance at the end of August ; it is Factory Building Studies No. 2, issued by the Building Research Station and published by HMSO. It is the work of two authors—each an architect—and, for this reason, as well as because it is sponsored by the Factory Building Research Committee, it may be expected to receive some attention from other architects who design factories and from prospective factory occupiers who need to state their requirements. The important subject of factory lighting has been dealt with in numerous publications from time to time, but even the general principles involved are not so well known to all concerned as to make their reiteration superfluous. As to the practical achievement of good natural and artificial factory lighting involving, as it does, the use of specially designed and suitably placed pieces of equipment, there is still much that can be said.

On the whole the new BRS publication is commendable but at least one of the recommendations it makes seems to go too far towards a not indisputable counsel of perfection. The statement is made that " from normal situations, fluorescent and filament lamps should not be visible from an angle of less than 45° above the horizontal." And again, " general lighting fittings should have a 45° cut-off. . . ." There are, of course, many modern factories having good lighting which is derived from luminaires that do not comply with this recommendation. In fact, most of the available industrial fluorescent and filament lamp fittings of most recent design are " out of court " if this recommendation is taken seriously.

Some of the statements about fluorescent lamps are not very happily worded. For instance, the sentence " It should be noted that fluorescent lamps gradually deteriorate in the amount of light they provide " may be taken as implying that filament lamps do not suffer in this way although, in fact, they too undergo a gradual diminution of light output during their shorter rated life. Then again, we read that " Good colour rendering, if required, will usually entail an extra running cost when fluorescent lamps are used." This seems to imply that other lamps —presumably tungsten—can provide good colour rendering at lower cost than fluorescent lamps. But this is not true. Probably what the quoted statement is intended to mean is merely that the luminous efficiency of colour matching fluorescent lamps is not as high as that of general service fluorescent lamps: even so, it is higher than the luminous efficiency of other colour matching sources.

In dealing with natural lighting it is mentioned that measurements of the illumination given by daylight in this country have been taken over a number of years. I was surprised, however, to read that " these have shown that the typical situation that occurs most frequently is that of the completely overcast sky " when " except on very dull days the level of illumination outdoors can be expected to be about 500 lumens per square foot." This is intended to explain why an outdoor illumination of 500 lm/ft² has been generally adopted as a convention for the purposes of daylight design. But this value is merely—as Walsh puts it (Textbook of Illuminating Engineering)—" the lowest at which we can reasonably expect to find the daylight indoors just sufficient." It is news to me that it is the most frequently occurring outdoor daylight illumination. Now—having carped a bit—I must congratulate the authors of this publication upon including in their summary of the principles of good lighting the statement that " monotony should at all costs be avoided." All conventional artificial lightings may induce monotony unless exposure to them is limited to relatively short spells. This is because—unlike natural lightings—they are " stills " and changeless.

IN September the Design Centre in London's Haymarket staged a small home lighting exhibition, featuring luminaires *à la mode*. I paid it a visit and had an eyeful of truncated and non-truncated cones, pierced and unpierced ; of suspended curvilinear vases and straight cylinders ; of variously bulbous plastic creations ; of two-piece " flying saucer " type general lighting luminaires and stalky floor standards. I got the impression that, attractive as some of these creations are in appropriate settings, there is little to choose between many of them. Their styling—like that of different contemporary motor cars—differs yet is so similar as to be undistinctive. The imagination of designers seems almost to have exhausted the possibilities of the current vogue, unless my impression comes from an insufficiently representative sample.

THE August issue of the American *Illuminating Engineering* contains some revealing views of a correspondent from Nela Park on the new American IES footcandle levels in residences. Apparently (and not surprisingly) some of these levels are very difficult to obtain in any currently practicable way. As one example, the writer cites a study desk, over the working surface of which maintenance of the recommended minimum illumination of 70 footcandles at all times would require the use of two desk lamps using 200 watts each ! However, it has been possible " to attain on an *average* basis (not on the basis of the recommended level everywhere on the task at all times) the new footcandles for typical critical and prolonged tasks in the family room by the use of slightly under 10 watts per square foot . . . the installation includes five well designed local luminaires augmented by fluorescent wall lighting on four walls and eight downlights." Just fancy, all this in a living room of 280 square feet of floor area ! It is said that the comfort in the room is high but " cost is far beyond what the industry has yet been able to sell to the majority of home owners "—no wonder ! The writer gives the low-down on American home lighting in this way: " less than 15 per cent of the homes today will meet the previous IES standards published for over ten years. Currently 62 per cent of American homes have less than a total of 25 bulbs in six rooms (approximately 75 bulbs are required to meet the 1953 IES Practice and it is assumed more will be required for the new levels)." Presumably, not a single American home yet meets the new standards.

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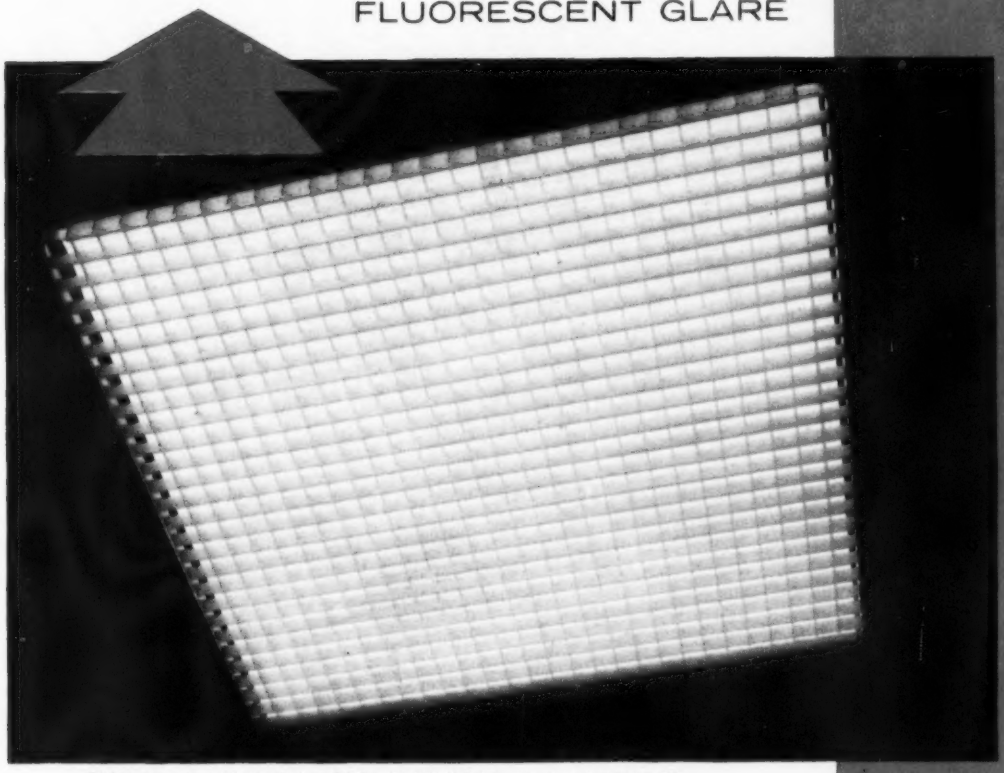

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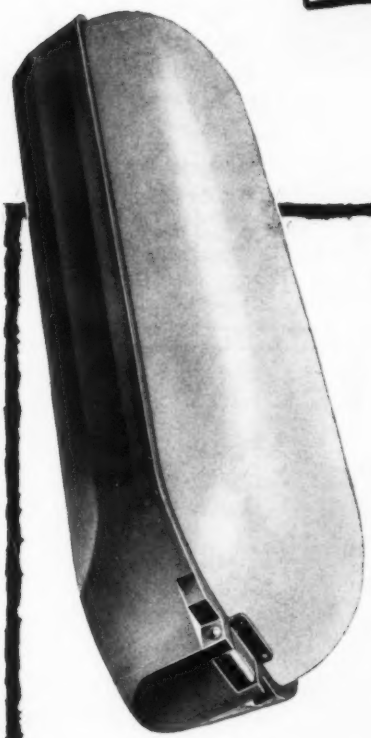

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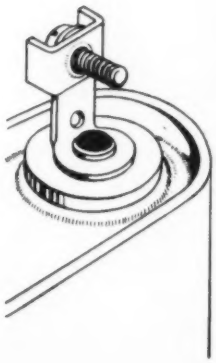

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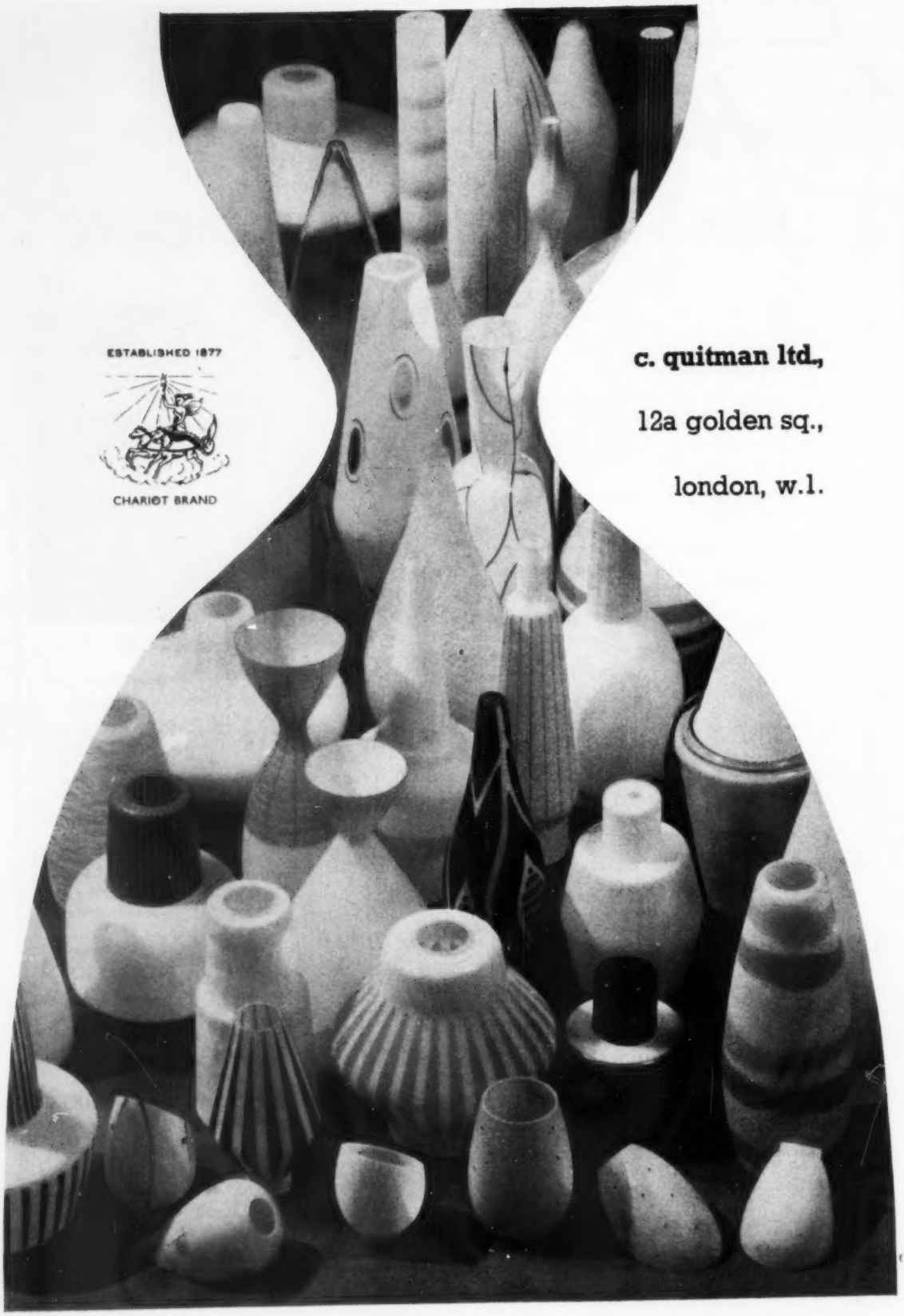

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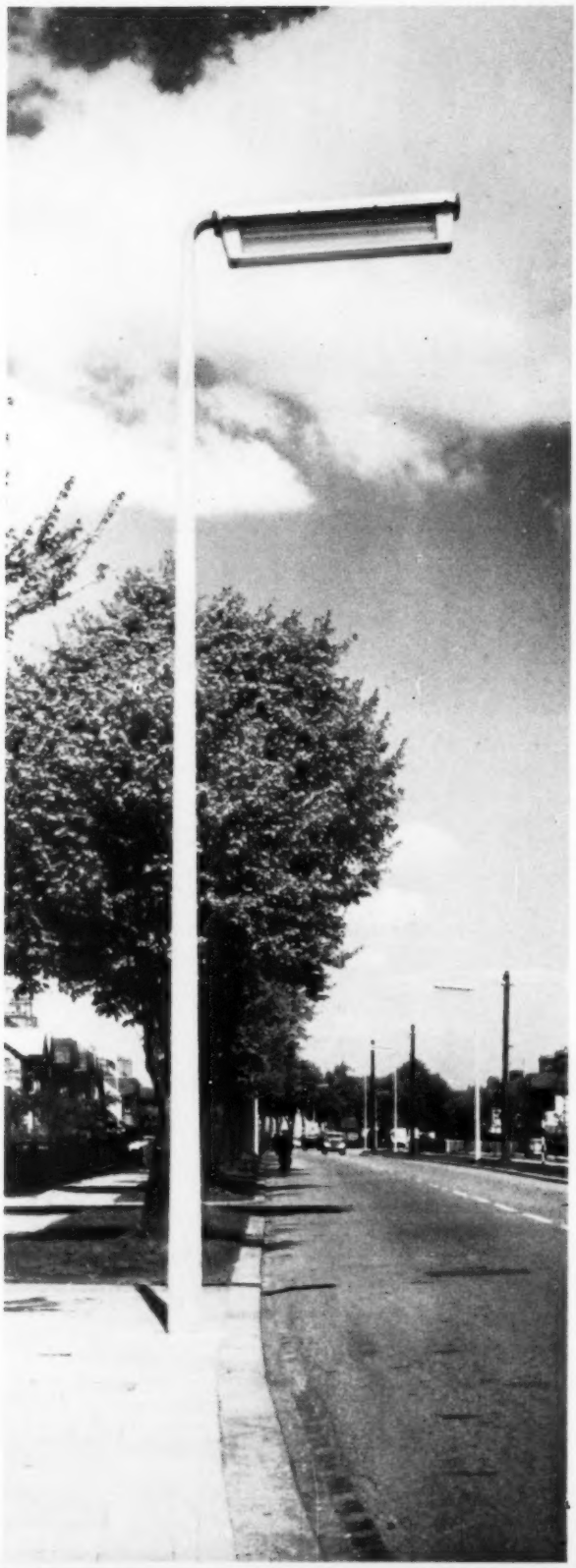

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